

SECTION I

MULTIPLE CHOICE QUESTIONS

C h a p t e r -----

15

HOMEOSTASIS

2MCQs

I) From Exercise:-

- The protection of an animal environment from the harms of fluctuations is the definition of which of the followings?
 - Osmoregulation
 - Excretion
 - Thermoregulation
 - Homeostasis
- The category of the plants that has adaptations of small and thick leaves to limit water loss are called:
 - Hydrophytes
 - Xerophytes
 - Mesophytes
 - Hygrophytes
- The environment where animals produce large volumes of diluted urine: (Multan Board (S) 2009)
 - Hypotonic aquatic
 - Isotonic aquatic
 - Hypertonic aquatic
 - Terrestrial
- Which of the following is called as excretophore i.e. contributing mainly in the elimination of wastes in plants?
 - Stem
 - Roots
 - Leaves
 - Flowers
- The excretory product that requires minimum water for its elimination compared to others:
 - Urea
 - Uric acid
 - Creatinine
 - Ammonia
- The groups of animals whose excretory system is structurally associated with nutritive tract:
 - Vertebrates
 - Earthworm
 - Planaria
 - Insects
- The excretory structures that deliver urine from kidney to urinary bladder:
 - Urethra
 - Pelvis
 - Ureter
 - Collecting tubule
- The metabolic wastes that are ingested into the body and must be removed: (Bahawalpur Board-2009-)
- Pesticides
 - Drugs
 - Food additives
 - All of these
- Which of the following is not endotherm?
 - Bird
 - Amphibians
 - Flying insects
 - Mammals
- Name the type of adaptations from the followings that is responsible for shivering thermogenesis:
 - Structural
 - Physiological
 - Behavioral
 - None of these

II) From Punjab Boards:-

LAHORE BOARD

- All of the following are synthesized by liver except:

(Lahore Board-2008-

- Glucagon
 - Albumin
 - Fibrinogen
 - Prothrombin
- Of all the kidney stones, the incidence of calcium phosphate types of stones are the: (Lahore Board-2008-
 - 70 %
 - 20 %
 - 10 %
 - 15 %
- The end product of hemoglobin and metabolites of various hormones is: (Lahore Board-2009-A)
 - Uric acid
 - Bilirubin
 - Creatinine
 - All of these
- The incidence of calcium phosphate stones in kidney of man is: (Lahore Board-2010-A)
 - 10 %
 - 15 %
 - 20 %
 - 30 %
- Animals excreting ammonia are: (Lahore Board-2011-
 - Ureotelic
 - Uricotelic
 - Ammonotelic
 - Excretotelic
- Major homeostatic function of liver is storage of: (Lahore Board Group-I-2012-
 - Bile
 - Cholesterol
 - Urea
 - Iron
- Bat does not regulate body temperature in narrow range and is: (Lahore Board Group-I-2012-A)
 - Endotherm
 - Homeotherm
 - Heterotherm
 - Poikilotherm
- Fishes retain, which of these chemicals to be protected against urea: (Lahore Board Group-II-2012-
 - Allantoin
 - Creatine
 - Xanthine
 - Trimethylamine oxide
- Glomerulus circulates blood through capsule as it arrives through: (Lahore Board Group-II-2012-A)
 - Vasa recta
 - Peritubular capillaries
 - Afferent arterioles
 - Efferent arterioles
- Metabolism of purine and pyrimidine produces significance amount of: (Lahore Board Group-I-2013-
 - Creatinine
 - Creatine
 - Xanthine
 - Trimethylamine oxide
- Which part of brain monitor the body temperature: (Lahore Board Group-I-2013-A)
 - Thalamus
 - Pons
 - Hypothalamus
 - Amygdala
- Incidence of uric acid stone is: (Lahore Board- Group-II-2013-
 - 5 %
 - 10 %
 - 15 %
 - 70 %
- Which one of the following is heterotherm? (Lahore Board-Group-II-2013-
 - Bat
 - Frog

- c) Snake d) Man
- 14) Metabolism of purines and pyrimidines produce significant amount of:
(Lahore Board-Old Scheme-Group-II-2014-
A)
- a) Creatinine b) Creatine
c) Xanthine d) Trimethyleamine oxide
- 15) Flame cells are part of excretory system of:
(Lahore Board-Old Scheme-Group-II-2014-
A)
- a) Planaria b) Hydra
c) Earthworm d) Cockroach
- 16) A diluted solution compared to cell concentration is termed as:
(Lahore Board-New Scheme-Group-I-2014-
A)
- a) Hypertonic b) Hypotonic
c) Isotonic d) Paratonic
- 17) Number of Ammonia molecules required to produce one molecule of urea is:
(Lahore Board-New Scheme-Group-I-2014-
A)
- a) 1 b) 2
c) 3 d) 4
- 18) The incidence of calcium oxalate type stones of kidney is:
(Lahore Board-New Scheme-Group-II-2014-
A)
- a) 50 % b) 60 %
c) 15 % d) 70 %
- 19) Which organ is the central station of metabolism:
(Lahore Board-New Scheme-Group-II-2014-
A)
- a) Liver b) Kidney
c) Spleen d) Skin

GUJRANWALA BOARD

- 1) The animals which do not adjust their internal salt concentration according to external environment are:
(Gujranwala Board—2008-A)
- a) Osmoregulators b) Thermoregulators
c) Osmoconformers d) None of these
- 2) Metanephridium is present in:
(Gujranwala Board-2008-
A)
- a) Hydra b) Planaria
c) Earthworm d) Cockroach
- 3) Which one is said to be excretophore?
(Gujranwala Board-2009-
A)
- a) Stem b) Root
c) Bark d) Leaves
- 4) Reptiles are included in:
(Gujranwala Board-2010-
A)
- a) Homeotherms b) Endotherms
c) Ectotherms d) Heterotherms
- 5) The excretory product which requires minimum water for its removal: (Gujranwala Board-2011-
A)

- a) Urea b) Uric acid
c) Creatinine d) Ammonia
- 6) The mesophyte plant is: (Gujranwala Board-2011-
A)
- a) Cacti b) Hydrilla
c) Brassic d) Kikar
- 7) Uric acid is produced from:
(Gujranwala Board—2012-
A)
- a) Amino acid b) Nucleic acid
c) Fatty acid d) Protein
- 8) Most land mammals respond to cold by raising their:
(Gujranwala Board-2013-
A)
- a) Tail b) Head
c) Legs d) Furs
- 9) Flame cells are part of excretory system of:
(Gujranwala Board-2013-
A)
- a) Cockroach b) Earthworm
c) Hydra d) Planaria
- 10) Protonephridium is found in:
(Gujranwala Board-New Scheme-2014-
A)
- a) Hydra b) Planaria
c) Earthworm d) Cockroach
- 11) The central station of metabolism and the body's central metabolic clearing agent is:
(Gujranwala Board-New Scheme-2014
A)
- a) Stomach b) Liver
c) Cork d) Gut
- 12) The more concentrated external environment is termed as:
(Gujranwala Board-New Scheme-2015-
A)
- a) Hypotonic b) Hypertonic
c) Isotonic d) Osmotic
- 13) Which one is not a mesophyte?
(Gujranwala Board-New Scheme-2015-
A)
- a) Brassica b) Rose
c) Mango d) Cacti

MULTAN BOARD

- 10) The reptiles and birds inhabit land environment, so excrete:
(Multan Board-2008-A)
- a) Ammonia b) Urea
c) Uric acid d) Nitrates
- 2) The Malpighian tubules remove Nitrogenous wastes from the:
(Multan Board-2008-A)
- a) Lymph b) Haemolymph
c) Hind gut d) Coelomic fluid
- 3) From the kidney, urine is carried to urinary bladder by:
(Multan Board-2008-
S)
- a) Ureters b) Urethra
c) Pelvis d) Collecting tubules
- 4) Flame cells are part of excretory system of:
(Multan Board-2008-
S)
- a) Hydra b) Planaria
c) Earthworm d) Cockroach
- 5) Humming bird belongs to a category called:

- (Multan Board-2009-
A) a) Endotherm b) Ectotherm
c) **Heterotherm** d) Poikilotherm
- 6) The environment where the animals produce large volume of diluted urine: (Multan Board-2009-S)
a) **Hypotonic aquatic** b) Isotonic aquatic
c) Hypertonic aquatic d) Terrestrial
- 7) Bats and humming birds are examples of: (Multan Board-2010-
A) a) Ectotherms b) Endotherms
c) **Heterotherms** d) Poikilotherms
- 8) Most cartilaginous fishes possess salt secreting organ known as the: (Multan Board-2010-A)
a) Foetal gland b) Caecal gland
c) **Rectal gland** d) Sebaceous gland
- 9) The active uptake of Sodium in the loop of Henle is provided by the action of hormone: (Multan Board-2010-
A) a) Cortisone b) Testosterone
c) **Aldosterone** d) Progesteron
- 10) The best selective process in the Nephron is called: (Multan Board-2010-
S) a) **Secretion** b) Filtration
c) Reabsorption
d) Transport across the epithelium of collecting duct
- 11) How much water is needed to excrete 1g of Ammonia Nitrogen: (Multan Board-2011-A)
a) 400 ml b) **500 ml**
c) 600 ml d) 700 ml
- 12) Which one is not Poikilotherm? (Multan Board-2011-
A) a) Star fish b) Frog
c) Tortoise d) **Parrot**
- 13) Extracellular environment may be of diluted solution compared to cell concentration, thus designated as: (Multan Board-2011-S)
a) Isotonic b) Hypertonic
c) **Hypotonic** d) Cotic
- 14) Those plants which have moderate water availability are called: (Multan Board-2011-S)
a) Hydrophytes b) **Mesophytes**
c) Xerophytes d) Saprophytes
- 15) Lizards bask in sun to gain: (Multan Board-2012-
S) a) **Heat** b) Cold
c) Air d) Moisture
- 16) During infection, pyrogens are produced in the human body by: (Multan Board-2012-A)
a) RBCs b) **WBCs**
c) Platelets d) Blood Plasma
- 17) Which one of the following structures is present in earthworm? (Multan Board-2012-
S) a) **Metanephridium** b) Protonephridium

- c) Malpighian tubules d) Nephron
- 18) Urea is produced in: (Multan Board-2012-
S) a) Lungs b) **Liver**
c) Kidney d) Pancreas
- 19) Arginase splits arginine to form urea and: (Multan Board-2013-
A) a) Citrulline b) **Ornithine**
c) Creatinine d) Histidine
- 20) In bacterial and viral infections, there occurs an increase in the number of: (Multan Board-2013-
A) a) Antigens b) Erythrocytes
c) **Leucocytes** d) Platelets
- 21) The incidence of Calcium Oxalate type of Kidney Stone is: (Multan Board-Old Scheme-2014-
A) a) 10 % b) 15 %
c) **70 %** d) 80 %
- 22) Saliva and urine are used for evaporating cooling by: (Multan Board-Old Scheme-2014-
A) a) **Bats** b) Dogs
c) Birds d) Seals
- 23) The excretory product that requires maximum water for its removal is: (Multan Board-New Scheme-2014-
A) a) **Ammonia** b) Creatinine
c) Urea d) Uric acid
- 24) The human abdominal cavity is lined by: (Multan Board-New Scheme-2014-
A) a) Ectoderm b) Endoderm
c) **Peritonium** d) Epidermis
- 25) Mammalian kidney including human is adapted to conserve water upto: (Multan Board-New Scheme-2015-
A) a) 69.5 % b) 79.5 %
c) 89.5 % d) **99.5 %**
- 26) Freshwater protozoans pump out excess water by: (Multan Board-New Scheme-2015-
A) a) **Contractile vacuole** b) Food Vacuole
c) Pinocytosis d) Phagocytosis

BAHAWALPUR BOARD

- 1) In restricted supply of water, one of these cannot be kept as excretory product: (Bahawalpur Board-2008-
A) a) Urea b) Uric acid
c) **Ammonia** d) None of these
- 2) The high level of renal failure is also called: (Bahawalpur Board-2009-
A) a) Dialysis b) **Uremia**
c) Pelvis d) Death

3) The metabolic wastes that are ingested into the body and must be removed are:
(Bahawalpur Board-2009-S)

- a) Pesticides b) Drugs
c) Food additives d) All these

4) Basic unit of of Excretory System in humans is:
(Bahawalpur Board-2010-A)

- a) Ureter b) Nephron
c) Pelvis d) Urinary bladder

5) Plant Organ also called Excretophore is:
(Bahawalpur Board-2010-A)

- a) Leaf b) Stem
c) Root d) Fruit

6) The desert animals survive without drinking water by feeding on rich carbohydrate seeds of desert plants are:
(Bahawalpur Board-2010-S)

- a) Zebra b) Kangaroo rat
c) Deer d) Lion

7) Ammonia is secreted mostly by:
(Bahawalpur Board-2010-S)

- a) Insects b) Bony fishes
c) Adult Amphibians d) Birds

8) Urine leaves the kidney through a duct called:
(Bahawalpur Board-2011-A)

- a) Urethra b) Ureter
c) Urinary bladder d) Pelvis

9) Increased Plasma level of Urea is an indication of:
(Bahawalpur Board-2011-A)

- a) Renal Failure b) Kidney Stones
c) Hypocalcaemia d) Hyperoxaluria

10) The removal of Nitrogenous wastes that requires less amount of water is:
(Bahawalpur Board-2012-A)

- a) Urea b) Ammonia
c) Uric acid d) Lactic acid

11) The incidence of Calcium Oxalate Stones in kidneys are:
(Bahawalpur Board-2012-A)

- a) 50 % b) 70 %
c) 80 % d) 90 %

12) Excretory product of Hypo-osmotic Environment is:

- a) Salt b) Water
c) Glucose d) Uric acid

13) The evaporating cooling in the respiratory tract is the mechanism called:
(Bahawalpur Board-2013-A)

- a) Vasodilation b) Vasoconstriction
c) Insulation d) Panting

14) Nephridia are the excretory structures present in:
(Bahawalpur Board-New Scheme-2014-A)

- a) Hydra b) Planaria
c) Cockroach d) Earthworm

15) Activation of Sweat Glands to produce Sweat for evaporative cooling is a type of adaptation:
(Bahawalpur Board-New Scheme-2014-A)

- a) Structural b) Physiological
c) Behavioral d) None of these

16) Freshwater flatworms excrete:
(Bahawalpur Board-New Scheme-2015-A)

- a) Very Dilute Urine
b) Very Concentrated Urine
c) Slightly Concentrated Urine
d) Moderately Concentrated Urine

17) The removal of sebum on the is for:
(Bahawalpur Board-New Scheme-2015-A)

- a) Nutrition b) Excretion
c) Protection d) Thermoregulation

FAISALABAD BOARD

1) The excretory system of Planaria is:
(Faisalabad Board-2008-A)

- a) Metanephridium b) Nephron
c) Protonephridium d) Nephridium

2) Which one of these ions is conserved by aldosterone by preventing its lost from kidney tubules?
(Faisalabad Board-2008-A)

- a) Ca^{++} b) K^{+}
c) Mg^{++} d) Na^{+}

3) Which monitors the body temperature?
(Faisalabad Board-2009-A)

- a) Thyroid b) Thalamus
c) Pons c) Hypothalamus

4) The end products of hemoglobin break down:
(Faisalabad Board-2010-A)

- a) Uric acid b) Bilirubin
c) Creatinine d) Uric acid

5) Sodium uptake in nephron is promoted by:
(Faisalabad Board-2010-A)

- a) Cortisone b) Aldosterone
c) ADH d) FSH

6) Liver synthesizes except:
(Faisalabad Board-2010-S)

- a) Albumin
b) Prothrombin
c) Insulin

7) The more concentrated environment is termed as:
(Faisalabad Board-2010-A)

- a) Hypotonic b) Isotonic
c) Hypertonic d) An-isotonic

8) In urea cycle, the detoxified form of ammonia is:
(Faisalabad Board-2011-A)

- a) Urea b) Ammonium ions
c) Uric acid d) Nitrates

- 9) The chemical substances, responsible for raising human body temperature are:

(Faisalabad Board-2011-

- A) a) Leucocytes b) Pyrogens
c) Pyrexia d) Pollutants

- 10) Hydrophytes possess:

(Faisalabad Board-2012-

- A) a) Small leaves b) Large leaves
c) Less water
d) Stomata on lower surface of leaves

- 11) The incidence of calcium phosphate stones in kidneys is:

(Faisalabad Board-2012-A)

- a) 20 % b) 15 %
c) 18 % d) 25 %

- 12) The major homeostatic function of liver is to synthesize:

(Faisalabad Board-2013-A)

- a) Iron b) Glycogen
c) Bile d) Red blood cells

- 13) The animals that generate their own body heat through heat production, as by product, during metabolism are called:

(Faisalabad Board-2013-

- A) a) Endotherms b) Ectotherms
c) Heterotherms d) All of these

- 14) Uric acid is excreted out as solid excreta in:

(Faisalabad Board-Old Scheme-2014-

- A) a) Earthworm b) Cockroach
c) Star fish d) Planaria

- 15) The cuticle is thick, waxy and stomata are in lower depressions of leaves:

(Faisalabad Board-Old Scheme-2014-

- A) a) Epiphytes b) Mesophytes
c) Xerophytes d) Hydrophytes

- 16) Flame cells are the excretory structures of:

(Faisalabad Board-Old Scheme-2014-

- A) a) Cockroach b) Star fish
c) Planaria d) Snail

- 17) What is an endotherm?

(Faisalabad Board-New Scheme-2014-

- A) a) Birds b) Bats
c) Huming bird d) Reptiles

- 18) In juxtamedullary nephron additional capillaries extend down to form a loop of vessels called:

(Faisalabad Board-New Scheme-2014-

- A) a) Peritubular capillaries
b) Efferent arterioles
c) Vasa recta d) Glomerulus

- 19) The nitrogenous waste which is highly toxic and dissolves quickly in body fluids is:

(Faisalabad Board-New Scheme-2015-

- A) a) Ammonia b) Urea
c) Uric acid d) CO₂

- 20) Cockroach and other insects remove their nitrogenous wastes in the form of:

(Faisalabad Board-New Scheme-2015-A)

- a) Ammonia b) Urea
c) Uric acid d) Creatinine

RAWALPINDI BOARD

- 1) In cockroach most of the re-absorption of salts and

water takes place in the:

(Rawalpindi Board-2010-

- A) a) Intestine b) Midgut
c) Rectum d) Malpighian tubules

- 2) The incidence of calcium oxalate type stones are:

(Rawalpindi Board-2011-

- A) a) 50 % b) 70 %
c) 80 % d) 90 %

- 3) The most toxic nitrogenous waste is:

(Rawalpindi Board-2011-

- A) a) Urea b) Uric acid
c) Creatinine d) Ammonia

- 4) Which one of the following is excretophore?

(Rawalpindi Board-2012-

- A) a) Stem b) Root
c) Bark d) Leaves

- 5) The arginine is split by arginase to form urea and

the precursor:

(Rawalpindi Board-2012-

- A) a) Ornithine b) Citrulline
c) Alanine d) Glycine

- 6) Which part of the body serves as an excretophore?

(Rawalpindi Board-2013-

- A) a) Root b) Stem
c) Leaves d) Flowers

- 7) Non-surgical removal of kidney stone is called:

(Rawalpindi Board-2013-

- A) a) Dialysis b) Kidney transplant
c) Uremia d) Lithotripsy

- 8) Blood supplied to kidneys from each cardiac beat is:

(Rawalpindi Board –New Pattern-2014-

- A) a) 10 % b) 20 %
c) 30 % d) 50 %

- 9) Supercool cytosol without ice formation, is caused

by:

(Rawalpindi Board –New Pattern-2014-

- A) a) Heat shock proteins
b) Unsaturated fatty acids
c) Solutes
d) Enzymes

- 10) The plants that have adaptation of small and thick leaves to reduce water loss are called:

(Rawalpindi Board-New Pattern-2015-

- A) a) Hydrophytes b) Mesophytes

- c) Xerophytes d) Hygrophytes
 11) The excretory product that requires minimum water for its elimination is:
 (Rawalpindi Board-New Pattern-2015-
 A)
 a) Urea b) Uric acid
 c) Ammonia d) Creatinine

SARGODHA BOARD

- 1) Production of sweat and sebum is related with:
 (Sargodha Board-2010-
 A)
 a) Skin b) Liver
 c) Lung d) Gills
 2) Which one is not part of human urinary system?
 (Sargodha Board-2010-
 A)
 a) Kidney b) Ureter
 c) Pelvis d) Pubis
 3) Bats and humming birds are called:
 (Sargodha Board-2011-
 A)
 a) Ectotherm b) Endotherm
 c) Poikilotherms d) Heterotherm
 4) Abdomen has peritoneal cavity, lined by a thin epithelium called:
 (Sargodha Board-2011-
 A)
 a) Peritonium b) Pericardium
 c) Scrotal sac d) Pleura
 5) The high level of renal failure is called:
 (Sargodha Board-2012-
 A)
 a) Death b) Uremia
 c) Anemia d) Sciatica
 6) Shark excrete nitrogenous wastes in the form of:
 (Sargodha Board-2012-
 A)
 a) Ammonia b) Uric acid
 d) Urea d) Allantoin
 7) Which of the following is the structural adaptation of animals for thermoregulation?
 (Sargodha Board-2013-
 A)
 a) Pelage
 b) Activation of sweat glands
 c) Plumage fluffing d) Urination
 8) Which one is the least toxic among the followings:
 (Sargodha Board-2013-
 A)
 a) Urea b) Uric acid
 c) Ammonia d) Both a and b

DERA GHAZI KHAN BOARD

- 1) The protection of internal environment from the harms of the fluctuations in the external environment of an organism is termed as:
 (Dera Ghazi Khan Board-2009-
 A)
 a) Apoptosis b) Osmosis
 c) Anhydrobiosis d) Homeostasis

- 2) The animal which can survive without drinking water is:
 (Dera Ghazi Khan Board-2010-
 A)
 a) Camel b) Kangaroo
 c) Kangaroo rat d) Rat
 3) The absorption of sodium in the ascending limb of the loop of Henle is controlled by a hormone known as:
 (Dera Ghazi Khan Board-2010-
 A)
 a) Aldosterone b) Antidiuretic
 c) Progesterone d) Testosterone
 4) High degree of renal failure is also called:
 (Dera Ghazi Khan Board-2011-
 A)
 a) Uremia b) Leukemia
 c) Anemia d) Lithotripsy
 5) The incidence of Calcium Oxalate type stones are:
 (Dera Ghazi Khan Board-2011-
 A)
 a) 75 % b) 15 %
 c) 10 % d) 70 %
 6) Ammonia is produced as excretory product by the animals inhabiting the medium:
 (Dera Ghazi Khan Board-2012-
 A)
 a) Isotonic b) Hypotonic
 c) Hypertonic d) Xeric
 7) Fresh water protozoans pump out excess water by:
 (Dera Ghazi Khan Board-
 2012A)
 a) Food vacuole b) Pinocytosis
 c) Contractile vacuole d) Phagocytosis
 8) Uric acid is produced from:
 (Dera Ghazi Khan Board-Group-I-2013-
 A)
 a) Nitrates b) Creatine
 c) Nucleic acids d) Amino acids
 9) Hag fishes are:
 (Dera Ghazi Khan Board-Group-I-2013-
 A)
 a) Osmoregulators b) Isotonic
 c) Hydrophytes d) Chondrocytes
 10) The major homeostatic function of liver is storage of:
 (Dera Ghazi Khan Board-Group-II-2013-A)
 a) Bile b) Glycogen
 c) Urea d) Albumin
 11) The protonephridium is the excretory organ of:
 (Dera Ghazi Khan Board Group II.
 2013)
 a) Amoeba b) Hydra
 c) Planaria d) Earthworm
 12) The more concentrated external environment is termed as:
 (D.G.K. Board-New Scheme-Group-I-2014-
 A)
 a) Hypotonic b) Hypertonic
 c) Isotonic d) Peritonic
 13) Nitrogenous waste is very toxic and dissolves quickly in body fluids is:

(D.G.K. Board-New Scheme-Group-I-2014-

- A)
 a) CO₂ b) Urea
 c) Ammonia d) Uric acid
 14) The incidence of calcium oxalate type stone is:

(D.G.K. Board-New Scheme-Group-II-2014-

- A)
 a) 10 % b) 15 %
 c) 25 % d) 70 %

- 15) Excretory structures present in cockroach are:
 (D.G.K. Board-New Scheme-Group-II-2014-

- A)
 a) Contractile vacuole b) Malpighian tubules
 c) Nephridia d) Flame cells

- 16) Which of the following is an Endotherm?
 (D.G.K. Board-New Scheme-Group-I-2015-

- A)
 a) Huming Bird b) Reptiles (Lizard)
 c) Birds d) Bat

- 17) The mechanism of evaporative cooling in respiratory tract of dog is known as:
 (D.G.K. Board-New Scheme-Group-I-2015-

- A)
 a) Panting b) Shivering
 thermogenesis
 b) Thermogenesis d) Vasodilation

- 18) Saliva and urine are used for evaporating cooling by:
 (D.G.K. Board-New Scheme-Group-II-2015-

- A)
 a) Bat b) Dogs
 c) Birds d) Seals

- 19) The homeostatic thermostat is present in:
 (D.G.K. Board-New Scheme-Group-II-2015-

- A)
 a) Pituitary b) Hypothalamus
 c) Pancreas b) Kidney

- 20) The incidence of calcium oxalate type of kidney stones is:
 (D.G.K. Board-New Scheme-Group-II-2015-

- A)
 a) 10 % b) 15 %
 c) 70 % d) 80 %

SAHIWAL BOARD

- 1) Detection of change and signaling for effectors response to the control system is a:
 (Sahiwal Board-2013-

- A)
 a) Negative feed back b) Positive feed back
 c) Inter-coordination d) Feedback mechanism

- 2) Aldosterone plays role in:
 (Sahiwal Board-2013-

- A)
 a) Transport of water
 b) Uptake of sodium in loop of Henle
 c) Transport of K⁺ ions into kidney
 d) Re-absorption of water

- 3) Mechanism, which eliminates nitrogenous waste, is referred as: (Sahiwal Board-New Scheme-2014-A)

- a) Osmoregulation b) Excretion
 c) Thermoregulation d) Ejection

- 4) Anhydrobiosis refers to tolerate:

(Sahiwal Board-New Scheme-2014-

- A)
 a) Dehydration b) Hydration
 c) Anhydration d) Rehydration

- 5) The more concentrated external environment is termed as:

(Sahiwal Board-New Scheme-2015-

- A)
 a) Peritonic b) Hypotonic
 c) Hypertonic d) Isotonic

- 6) Which of the following is not synthesized in liver? (Sahiwal Board-New Scheme-2015-

- A)
 a) Urea b) Uric acid
 c) Albumin d) Urine

III) From Entry Test:-

- 1) ----- did not have the adaptations to remove the

flooding of their cells in freshwater:

(Entry Test-

- 2007)
 a) Both b and d c) None of b, d
 b) Hydrophytes d) Xerophytes

- 2) In nephron, most of the reabsorption takes place in

the:

(Entry Test-

- 2012)
 a) Distal tubule c) Ascending limb
 b) Proximal tubule d) Descending limb

- 3) Detection of change and signaling for effector's response to control system is a: (Entry Test-

- 2012)
 a) Negative feedback c) Inter-coordination
 b) Positive feedback d) Feedback

mechanism

- 4) Blood enters the glomerulus through:

(Entry Test-

- 2012)
 a) Efferent arteriole c) Renal artery
 b) Afferent arteriole d) Renal vein

- 5) Which portion of nephron is under the control of ADH? (Entry Test-

- 2012)
 a) Bowman's capsule
 b) Ascending arm
 c) Distal end and collecting ducts
 d) Descending arm

- 6) Which of the following are the functions of proximal convoluted tubule:

(Self-Test Questions-

- 2013)
 a) Ultrafiltration and reabsorption
 b) Selective reabsorption and retention of water
 c) Selective reabsorption and active tubular

secretion

- d) Reabsorption of water by the help of ADH

- 7) The walls of descending limb of loop of Henle are:

(Self-Test Questions-

- 2013)
 a) Permeable to water as well as to sodium and chloride
 b) Permeable to water but impermeable to salts

- c) Impermeable to water and permeable to sodium and chloride
 d) Impermeable to both water and salts
- 8) ADH affects which of the following for retention of water: (Self-Test Questions-2013)
- a) Walls of collecting duct
 b) Walls of loop of Henle
 c) Glomerulus
 d) Proximal convoluted tubule
- 9) The counter-current multiplier mechanism is shown by which of the following: (Self-Test Questions-2013)
- a) Loop of Henle
 b) Proximal convoluted tubule
 c) Distal convoluted tubule
 d) Bowman's capsule

C h a p t e r ---- 16

SPORTS AND MOVEMENTS

2MCQs

I) From Exercise:-

- 1) Which of these is a direct source of energy for muscle contraction?
- a) ATP b) Creatine phosphate
 c) Lactic acid d) Both a and b
- 2) When muscle contracts:
- a) Sarcomeres increases in size
 b) Myosin slides past actin
 c) Lactic acid is produced
 d) Both a and b
- 3) Which of the following changes occur when skeletal muscle contracts:
- a) The A band shorten b) The I band shorten
 c) The Z-line slide farther apart
 d) The actin filament contract
- 4) Thin filament in myofibrils consists of:
- a) Actin, tropomyosin, troponin b) Z line
 c) Myosin d) Sarcomere
- 5) The contraction of striated muscle is initiated by the release of energy in the presence of:
- a) Acetyl choline b) Calcium ion
 c) Chloride ion d) Iron
- 6) In the mammalian skeleton there is a distinct synovial joint between the:
- a) Bones of cranium b) Humerus and ulna
 c) Sacrum and ileum
 d) Sternum and floating ribs
- 7) Which of the following is a bone of axial skeleton?
- a) Rib b) Shoulder girdle
 c) Pelvis d) Femur
- e) All of the above
- 8) Vertebral column includes:
- a) Sacrum b) Coccyx
 c) Cervical, thoracic and lumbar vertebrae

- d) All of the above
- 9) In mammal the numbers of cervical vertebrae are:
- a) No definite number b) Seven
 c) Eleven d) Varies with size of neck
- 10) Brain is protected by:
- a) Cranium b) Skull
 c) Orbits d) All of these
- 11) Which of the following is plantigrade? (Lahore Board-2010-A) (Multan Board-2008-S)
- (Bahawalpur Board-2009-A)
- (Rawalpindi Board-2010-A)
- a) Rabbit b) Monkey
 c) Horse d) Carnivore
- 12) Brachioradialis causes the uplift of:
- a) Radius b) Ulna
 c) Both a and b d) Humerus
- 13) Molting occurs in the arthropods at the:
- a) Immature stage b) Mature stage
 c) Both stages
 d) Do not undergo molting
- 14) Muscle fatigue is caused by:
- a) CO₂
 b) Accumulation of lactic acid
 c) Fumaric acid
 d) Ethyl alcohol
- 15) Cardiac muscles are:
- a) Voluntary b) Involuntary
 c) Both a and b d) None of the above

II) From Punjab Boards:-

LAHORE BOARD

- 1) All of the following are related to axial skeleton except: (Lahore Board-2008-A)
- a) Skull b) Ribs
 c) Sternum d) Appendages
- 2) The collenchymas cells have protoplast and usually lack: (Lahore Board-2009-A)
- a) Secondary wall b) Primary wall
 c) Cell Membrane d) Vacuole
- 3) Spontaneous movements due to internal causes are: (Lahore Board-2009-A)
- a) Paratonic b) Tactic
 c) Taxis d) Autonomic
- 4) Which one of the following is plantigrade: (Lahore Board-2010-A)
- a) Rabbits b) Monkeys
 c) Horses d) Goats
- 5) The protein filament which binds to the calcium: (Lahore Board-2010-A)
- a) Actin b) Myosin
 c) Troponin d) Tropomyosin

- 6) Spontaneous movements due to internal causes are: (Lahore Board-2010-A)
 a) Autonomic b) Paratonic
 c) Tactic d) Tropic
- 7) The fusion of four posterior vertebrae present in the pelvic region form: (Lahore Board-2011-A)
 a) Cervical b) Coccyx
 c) Lumber d) Sacrum
- 8) A bone which connects scapula with sternum: (Lahore Board Group-I-2012-A)
 a) Humerus b) Ischium
 c) Pubis d) Clavicle
- 9) Action of Venus fly trap is an example of: (Lahore Board Group-I-2012-A)
 a) Nyctinasty b) Haptonasty
 c) Hyponasty d) Photonasty
- 10) Which of these are long, cylindrical and exist as bundle caps: (Lahore Board Group-II-2012-A)
 a) Sclereides b) Vessels
 c) Trachea d) Tracheids
- 11) Leaves go to sleep position, when turgor pressure decreases on lower side of: (Lahore Board Group-II-2012-A)
 a) Pelvis b) Pulvinus
 c) Callus d) Pubis
- 11) The problem in which contraction of entire muscle takes place and it lasts for just a few seconds to several hours is: (Lahore Board Group-I-2013-A)
 a) Tetanus b) Tetany
 c) Cramp d) Muscle fatigue
- 12) The joint that allows the movement in two directions: (Lahore Board Group-I-2013-A)
 a) Hinge joint b) Ball and socket joint
 c) Cartilagenous joint d) Fibrous joint
- 13) Number of cervical vertebrae in a male camel (Mammal): (Lahore Board Group-II-2013-A)
 a) 7 b) 11
 c) No definite number
 d) Varied with size of neck
- 14) Bone to bone attachment is by: (Lahore Board Group-II-2013-A)
 a) Tendon b) Nerves
 c) Muscles d) Ligament
- 15) The thick filament which are 16 mm in diameter are composed of: (Lahore Board-Old Scheme-Group-II-2014-A)
 a) Actin b) Myosin
 c) Tropomyosin d) Troponin
- 16) Ball and socket joint allows the movement in: (Lahore Board-Old Scheme-Group-II-2014-A)
 a) One direction b) Two directions

- c) Four directions d) Several directions
- 17) Which one of the following is not a joint disease: (Lahore Board-New Scheme-Group-I-2014-A)
 a) Arthritis b) Sciatica
 c) Disc slip d) Spondylolysis
- 18) Most efficient way of supporting the body is seen in: (Lahore Board-New Scheme-Group-I-2014-A)
 a) Fishes b) Aves
 c) Reptiles d) Mammals
- 19) Which one is not a bone of axial skeleton: (Lahore Board-New Scheme-Group-II-2014-A)
 a) Ribs b) Sternum
 c) Pelvic d) Cranium
- 20) Which animal has long narrow wings: (Lahore Board-New Scheme-Group-II-2014-A)
 a) Gull b) Owl
 c) Crow d) Eagle

GUJRANWALA BOARD

- 1) The movement in response to stimulus of light is called: (Gujranwala Board-2008-A)
 a) Phototactic movement
 b) Chemotactic movement
 c) Sleep movement
 d) Rapid movement
- 2) The joints that allow the movement in several directions are: (Gujranwala Board-2008-A)
 a) Ball and socket joints
 b) Hinge joints
 c) Fibrous joints d) Synovial joints
- 3) Vertebral column protects the spinal cord and has ----- curvatures: (Gujranwala Board-2009-A)
 a) 2 b) 4
 c) 3 d) 5
- 4) ----- is a condition in which palatine process of maxilla fails to fuse: (Gujranwala Board-2009-A)
 a) Arthritis b) Tetany
 c) Cleft palate d) Osteoporosis
- 5) Twisting around the actin chains there are two strands of another protein i.e: (Gujranwala Board-2010-A)
 a) Myosin b) Tropomyosin
 c) Troponin d) Creatine
- 6) The heartwood accumulates the chemical: (Gujranwala Board-2010-A)
 a) Cellulose b) Absciscins
 c) Chitin d) Resins
- 7) Fibers, sclereides and vessels are three types of:

(Gujranwala Board-2011-

- A) a) Collenchyma b) Sclerenchyma
c) Parenchyma d) Cambium

8) The bone dissolving cells are:

(Gujranwala Board-2011-

- A) a) Osteoblasts b) Stem cells
c) Osteocytes d) Osteoclasts

9) Cramp is also known as:

(Gujranwala Board-2012-

- A) a) Tetany b) Tetanic contraction
c) Tetanus d) Muscle fatigue

10) An increase in plant girth due to activity of vascular cambium is called:

(Gujranwala Board-2012-

- A) a) Primary growth b) Open growth
c) Secondary growth d) Tertiary growth

11) The disease caused by low calcium in the blood is called:

(Gujranwala Board-2013-

A)

- a) Cramp b) Paralysis
c) Tetany d) Tetanus

12) In old trees, the active conducting portion of wood is called:

(Gujranwala Board-2013-A)

- a) Sap wood b) Heart wood
c) Cedar wood d) Cork

14) The inactive non-conducting wood is called:

(Gujranwala Board-New Scheme-2014-

A)

- a) Heartwood b) Sapwood
c) Cork d) Bark

15) Action of Venus fly trap is:

(Gujranwala Board-New Scheme-2014-

A)

- a) Nyctinasty b) Photonasty
c) Haptonasty d) Theronasty

16) Bowed legs and deformed pelvis are the symptoms

of which disease in children?

(Gujranwala Board-New Scheme-2015-

A)

- a) Rickets b) Disc slip
c) Sciatica d) Haematoma

17) Which is the end of muscle which remains fixed when muscles contracts?

(Gujranwala Board-New Scheme-2015-

A)

- a) Insertion b) Origin
c) Tendon d) Belly

MULTAN BOARD

1) On or over the wound cambium forms:

(Multan Board-2008-

A)

- a) Callus b) Wood tissue
c) Both a and b d) Gall

2) A condition in which palatine process of maxilla and palatine fail to fuse is:

(Multan Board-2008-

A)

- a) Cleft palate b) Microcephaly
c) Arthritis d) None

3) In human thoracic region, the number of vertebrae is:

(Multan Board-2008-S)

- a) 7 b) 5
c) 4 d) 12

4) Which of the following mammal is plantigrade?

(Multan Board-2008-

S)

- a) Rabbit b) Horse
c) Monkey d) Deer

5) The living cells of cartilage are called:

(Multan Board-2009-

A)

- a) Osteoblasts b) Osteocytes
c) Chondrocytes d) Osteoclasts

6) Resistance to decay and insect attack to plant is provided by:

(Multan Board-2009-

A)

- a) Cork b) Callus
c) Sap wood d) Heart wood

7) In which of the following group of cells, the secondary cell wall is absent?

(Multan Board-2009-

S)

- a) Parenchyma b) Sclerenchyma
c) Trachieds d) Collenchyma

8) The membrane that bounds vacuole is called:

(Multan Board-2009-

S)

- a) Protoplast b) Tonoplast
c) Peritonym d) Pellicle

9) The collenchyma cells are highly lignified and found in:

(Multan Board-2010-

A)

- a) Epidermis b) Endodermis
c) Pith d) Xylem ?

10) The unit of structure of myofibril lies between two

successive Z lines and is known as:

(Multan Board-2010-

A)

- a) Sarcolemma b) Sarcoplasm
c) Sarcomere d) Myolemma

11) The living cells of cartilage are called:

(Multan Board-2010-

S)

- a) Osteoclasts b) Chondrocytes
c) Osteoblasts d) Osteocytes

12) The angular thickening in the primary wall of cell

is present in:

(Multan Board-2010-

S)

- a) Parenchyma b) Sieve tube
c) Collenchyma d) Sclerenchyma

13) Number of Thoracic Vertebrae in the Thoracic Region are:

(Multan Board-2011-

A)

- a) 8 Vertebrae b) 10 Vertebrae
c) 12 Vertebrae d) 14 Vertebrae

14) What is mortality rate in developing countries due

to Tetanus? (Multan Board-2011-

- A) a) 35 % b) 40 %
c) 45 % d) 50 %

15) The disease which causes immobility and fusion of vertebral joints is called: (Multan Board-2011-

- S) a) Sciatica b) Arthritis
c) Rickets d) Spondylitis

16) Auxins are also responsible for positive gravitropism of: (Multan Board-2011-S)

- a) Roots b) Stems
c) Leaves d) Branches

17) Opening of flower bud follows:

(Multan Board-2012-

- A) a) Photonasty b) Epinasty
c) Hyponasty d) Haptonasty

18) In terrestrial plants, the major mechanical stress is imposed by: (Multan Board-2012-

- A) a) Gravity b) Temperature
c) Wind d) Soil

19) Bark is made up of: (Multan Board-2012-S)

- a) Cork cambium, pith and phloem
b) Cork, cork cambium, cortex and phloem
c) Wood, pith and xylem
d) Xylem, phloem and cortex

20) Muscles are attached to bones with a bundle of collagen called tendons that is ----- in nature:

(Multan Board-2012-

- S) a) Elastic b) Non elastic
c) Fluid d) Semi fluid

21) In microcephaly, the individuals are born with small: (Multan Board-2013-

- A) a) Eyes b) Hands
c) Legs d) Skull

22) Glucagon causes an increase in level of blood:

(Multan Board-2013-

- A) a) Glucose b) Sucrose
c) Lactose d) Urea

23) ----- is unguligrade:

(Multan Board-Old Scheme-2014-

- A) a) Bear b) Man
c) Rabbit d) Goat

24) The living cells of cartilage are called:

(Multan Board-Old Scheme-2014-

- A) a) Osteocytes b) Osteoblasts
c) Osteoclasts d) Chondrocytes

25) The skeletal muscles are attached with the bones through the: (Multan Board-New Scheme-2014-

- A) a) Ligaments b) Tendons

- c) Sarcolemma d) Myofibrils

26) The sclerenchyma cells found in seed coats and nut shells are the:

(Multan Board-New Scheme-2014-

- A) a) Fibers b) Vessels
c) Tracheids d) Sclereids

27) The process of moulting is controlled by the nervous system and a hormone called:

(Multan Board-New Scheme-2015-

- A) a) Aldosterone b) Androgen
c) Ecdysone d) Oxytocin

28) The membrane that bounds vacuole is called:

(Multan Board-New Scheme-2015-

- A) a) Epiblast b) Tonoplast
c) Chloroplast d) Hypoblast

BAHAWALPUR BOARD

1) Movement in curvature of whole organ towards or away from stimuli is called:

(Bahawalpur Board-2008-

- A) a) Tropic b) Nastic
c) Heptic d) Tactic

2) The inactive non-conducting wood is called:

(Bahawalpur Board-2009-

- A) a) Sap wood b) Heart wood
c) Cork d) Callus

3) Which of the given is plantigrade?

(Bahawalpur Board-2009-

- A) a) Rabbits b) Monkeys
c) Horses d) Carnivores

4) The number of bones in our wrist:

(Bahawalpur Board-2009-

- S) a) 10 b) 14
c) 8 d) 5

5) Both bones and cartilage consist of living cells embedded in matrix of protein:

(Bahawalpur Board-2009-

- S) a) Collagen b) Keratin
c) Matrix d) None of these

6) Human vertebral column has ----- vertebrae:

(Bahawalpur Board-2010-

- A) a) 20 b) 23
c) 33 d) 37

7) The cervical vertebrae which lie in the neck region are:

(Bahawalpur

- Board-2010-A)
a) 5 b) 9
c) 7 d) 4

8) Commercial cork is made from tree such as:

(Bahawalpur Board-2010-

- S) a) Accasia b) Dilbergia sissoo
c) Quercus suber d) Ficus

9) Fibrous joints are found in:

(Bahawalpur Board-2011-

- A) a) Skull b) Leg
c) Arm d) Chest
- 10) Rickets in children result in bowed legs and deformed: (Bahawalpur Board-2011-

- A) a) Head b) Pelvis
c) Chest d) Pectoral girdle
- 11) The stomata are located on the upper surface only in: (Bahawalpur Board (A)

- 2012) a) Xerophytes b) Hydrophytes
c) Mesophytes d) Epiphytes
- 12) The growth movements are of: (Bahawalpur Board-2012-

- A) a) Two types b) Three types
c) Four types d) Five types
- 13) Which one of the following is Digitigrade Mammal: (Bahawalpur Board-2013-

- A) a) Rabbit b) Monkey
c) Guinea pig d) Zebra
- 14) The principal stimulus for photonasty is: (Bahawalpur Board-2013-

- A) a) Light b) Temperature
c) Photoperiod d) Touch
- 15) Muscles in the Gut Wall are: (Bahawalpur Board-New Scheme-2014-

- A) a) Smooth b) Skeletal
c) Cardiac d) Voluntary
- 16) Mature bone cells are called: (Bahawalpur Board-New Scheme-2014-

- A) a) Osteocytes b) Osteoclasts
c) Chondrocytes d) Blastocytes
- 17) Angular Thickenings in their primary walls are present in: (Bahawalpur Board-New Scheme-2015-

- A) a) Parenchyma b) Collenchyma
c) Sclerenchyma d) Tracheids
- 18) Hapatonastic Movements occur in response to: (Bahawalpur Board-New Scheme-2015-

- A) a) Contact b) Chemical
c) Temperature d) Water

FAISALABAD BOARD

- 1) Skeletal muscles are composed of: (Faisalabad Board-2008-

- A) a) Actin only b) Myosin only
c) Actin, myosin d) Actin, myosin and tropomyosin

- 2) The first cervical vertebra is called: (Faisalabad Board-2009-

- A) a) Atlas b) Axis

- c) Nasal d) Sacrum

- 3) Which one is bone of hind limb? (Faisalabad Board-2009-

- A) a) Radius b) Tarsal
c) Ulna d) Carpal

- 4) Hyponasty is caused by: (Faisalabad Board-2010-

- A) a) Auxin b) Cytokinin
c) Gibberellins d) Abscissic acid

- 5) Disease appearing due to low Ca^{++} level in blood: (Faisalabad Board-2010-

- A) a) Cramp b) Arthritis
c) Spondylosis d) Tetany

- 6) Which animals show digitigrade mode of locomotion? (Faisalabad Board-2011-

- A) a) Bear b) Deer
c) Rabbit d) Horse

- 7) Plant movements, due to external causes, are: (Faisalabad Board-2011-

- A) a) Turgor b) Tactic
c) Growth d) Paratonic

- 8) The group of cells usually lack secondary wall and have angular thickenings is: (Faisalabad Board-2012-

- A) a) Sclerenchyma b) Collenchyma
c) Fibers d) Vessels

- 9) The growing tip of young stem moves in zig-zag fashion of the apex are: (Faisalabad Board-2012-

- A) a) Hyponasty b) Epinasty
c) Nutation d) Haptonastic

- 10) The plant movement in response to stimulus of touch is: (Faisalabad Board-2012-

- A) a) Turgor b) Tactic
c) Phototropism d) Thigmotropism

- 11) The vertebral column of human consists of vertebrae: (Faisalabad Board-2013-

- A) a) 31 b) 32
c) 33 d) 34

- 12) This type of wood is most resistant to decay and insect attack: (Faisalabad Board-2013-

- A) a) Callus b) Hardwood
c) Heartwood d) Sapwood

- 13) Hinge joint allows the movement of bones in: (Faisalabad Board-Old Scheme-2014-

- A) a) Two directions b) Three directions
c) Four directions d) All directions

- 14) An increase in plant girth due to the activity of vascular cambium is called: (Faisalabad Board-New Scheme-2014-

- A) a) Primary growth b) Secondary growth

- c) Sap wood d) Heart wood
 15) Slightly elastic connective tissues that attach bone to bone are called:
 (Faisalabad Board-New Scheme-2014-

A)
 a) Tendons b) Brachialis
 c) Brachioradialis d) Ligament

- 16) In thoracic region, the number of vertebrae is:
 (Faisalabad Board-New Scheme-2015-

A)
 a) 12 b) 15
 c) 5 d) 4

- 17) Plantigrade mode of locomotion is observed in:
 (Faisalabad Board-New Scheme-2015-

A)
 a) Monkey b) Rabbit
 c) Goat d) Rodents

RAWALPINDI BOARD

- 1) Which of the following is plantigrade?
 (Rawalpindi Board-2010-

A)
 a) Horse b) Monkey
 c) Rabbit d) Carnivore

- 2) Which of the following is the earliest form of muscles?
 (Rawalpindi Board-2010-

A)
 a) Cardiac Muscles b) Smooth Muscles
 c) Skeletal Muscles d) Alary Muscles

- 3) Muscle fatigue is caused by accumulation of:
 (Rawalpindi Board-2011-

A)
 a) CO₂ b) Fumeric acid
 c) Lactic acid d) Alcohol

- 4) Femur, tibia and fibula are the bones of:
 (Rawalpindi Board-2011-

A)
 a) Neck b) Skull
 c) Fore limb d) Hind limb

- 5) The living cells of cartilage are called:
 (Rawalpindi Board-2012-

A)
 a) Osteoblasts b) Osteocytes
 c) Chondrocytes d) Osteoclasts

- 6) The collenchymas cells have protoplasts and usually lack:
 (Rawalpindi Board-2012-

A)
 a) Secondary wall b) Primary wall
 c) Cell membrane d) Vacuole

- 7) Cardiac muscles are the muscles of the:
 (Rawalpindi Board-2013-

A)
 a) Liver b) Heart
 c) Stomach d) Kidney

- 8) Which is not unguligrade?
 (Rawalpindi Board-2013-

A)
 a) Bear b) Deer
 c) Goat d) Horse

- 9) The hyphae of fungi are:
 (Rawalpindi Board-New Pattern-2014-

A)
 a) Phototactic b) Chemotactic
 c) Chemotropic d) Geotropic

- 10) Acute forms of arthritis usually result from:
 (Rawalpindi Board-New Pattern-2014-

A)
 a) Bacterial invasion b) Viral invasion
 c) Fungal invasion d) Severe injury

- 11) Muscle fatigue is caused by:
 (Rawalpindi Board-New Pattern-2015-

A)
 a) CO₂ b) Fumaric acid
 c) Ethyl alcohols d) Lactic acid

- 12) Which of the following has hydrostatic skeleton:
 (Rawalpindi Board-New Pattern-2015-

A)
 a) Man b) An insect
 c) Sea anemone d) Fish

SARGODHA BOARD

- 1) Tetanus is caused by: (Sargodha Board-2010-

A)
 a) Bacteria b) Virus
 c) Fungi d) Protists

- 2) Which one of the following is not plantigrade?
 (Sargodha Board-2010-

A)
 a) Man b) Ape
 c) Bear d) Rabbit

- 4) All the changes of moulting are controlled by the nervous system and the hormone:

(Sargodha Board-2011-

A)
 a) Serotonin b) Epinephrine
 c) Ecdysone d) Melanin

- 5) A condition in which palatine processes of maxilla and palatine fail to fuse is called:
 (Sargodha Board-2011-

A)
 a) Cleft palate b) Microcephaly
 c) Cretinism d) Myxedema

- 6) The membrane that bounds vacuole is called:
 (Sargodha Board-2012-

A)
 a) Tonoplast b) Protoplast
 c) Chloroplast d) Leucoplast

- 7) The hyphae of fungi show movements:
 (Sargodha Board-2012-

A)
 a) Thigmotropism b) Chemotropism
 c) Hydrotropism d) Geotropism

- 8) Which one of the following is not an unpaired bone:
 (Sargodha Board-2013-

A)
 a) Mandible b) Vomer
 c) Sphenoid d) Nasal

- 9) Which of the following has/have hydrostatic skeleton:
 (Sargodha Board-2013-

A)
 a) Mollusk b) Human
 c) Jelly fish d) Both a and c

DERA GHAZI KHAN BOARD

1) Skeletal muscles are composed of:
(Dera Ghazi Khan Board-2009-

- A) a) Actin only
b) Actin, myosin and tropomyosin
c) Myosin only d) Actin and myosin

2) Scapula is connected with sternum by:
(Dera Ghazi Khan Board-2009-

- A) a) Ribs b) Carpals
c) Clavicle d) None of the above

3) The folded leaflets of Mimosa regain the turgor in
----- minutes: (Dera Ghazi Khan Board-2010-

- A) a) 2 b) 5
c) 10 d) 15

4) The inner semi fluid present in disc is:
(Dera Ghazi Khan Board-2010-

- A) a) Annulus b) Nucleus pulposus
c) Herniation d) Spondylosis

5) The movement in response to stimulus of touch
i.e. climbing vines is called:
(Dera Ghazi Khan Board-2011-

- A) a) Phototropism b) Geotropism
c) Thigmotropism d) Hydrotropism

6) The collagen fibers of a bone are hardened by the
deposition of: (D.G.Khan Board-Group-I-2012-

- A) a) Calcium phosphate
b) Calcium carbonate
c) Calcium oxalate
d) Calcium silicate

7) In older trees, the active portion of the trunk is:
(D.G.K Board-Group-I-2012-

- A) a) Heartwood b) Blackwood
c) Annual growth ring d) Sapwood

8) Which one is the disease of children?
(D.G.K Board-Group-II-2012-

- A) a) Rickets b) Arthritis
c) Parkinson's disease d) Arteriosclerosis

9) Outer most layer of exoskeleton is:
(D.G.K Board Group-II-2012-

- A) a) Endocuticle b) Exocuticle
c) Procuticle d) Epicuticle

10) Outer most layer of exoskeleton is:
(D.G.K Board-Group-I-2013-

- A) a) Procuticle b) Epicuticle
c) Endocuticle d) Exocuticle

11) Structure formed by the fusion of posterior four
vertebrae of the pelvic region:
(D.G.K Board-Group-I-2013-

- A) a) Coccyx b) Sacrum
c) Pubis d) Ischium

12) The axial skeleton includes:

(D.G.K Board-Group-II-2013-

- A) a) Vertebrae b) Pelvic girdle
c) Pectoral girdle d) Limbs

13) Rickets is caused by deficiency of:
(D.G.K Board-Group-II-2013-

- A) a) Vitamin A b) Vitamin B
c) Vitamin C d) Vitamin D

14) The membrane that bounds vacuole is called:
(D.G.K Board-New Scheme-Group-I- 2014-

- A) a) Protoplast b) Tonoplast
c) Ectoplast d) Leucoplast

15) Joints that are held together by short fibers
embedded in connective tissue:
(D.G.K Board-New Scheme-Group-I- 2014-

- A) a) Fibrous joints b) Cartilaginous joints
c) Synovial joints d) Hinge joints

16) The connective tissue which attaches the bones
together is called:
(D.G.K Board-New Scheme-Group-II-2014-

- A) a) Ligament b) Tendon
c) Cross bridges d) Z-line

17) The disease which causes immobility and fusion
of vertebral joints is called:
(D.G.K Board-New Scheme-Group-II-2014-

- A) a) Disc slip b) Sciatica
c) Arthritis d) Spondylosis

18) The word tropic is derived from Greek word
tropos meaning:
(D.G.K Board-New Scheme-Group-I-2015-

- A) a) Sticky b) Turn
c) Attractive d) Growth

20) All of the following bones are associated with
coxal
bones, except:
(D.G.K Board-New Scheme-Group-I-2015-

- A) a) Ilium b) Ischium
c) Pubis d) Clavicle

21) Positive geotropism of root is due to:
(D.G.K Board-New Scheme-Group-II-2015-

- A) a) Auxin b) Gibberellin
c) Abscissic acid d) Ethene

SAHIWAL BOARD

1) Generally, each end of entire muscle is attached
to bone by bundle of collagen, non-elastic fibers
known as: (Sahiwal Board-2013-

- A) a) Tendon b) Ligament
c) Brachialis d) Origin

2) Osteoarthritis is the most common chronic
arthritis which is degenerative disease also
caused by: (Sahiwal Board-
2013-A)

- a) Genetic defect b) Hormonal defect
c) Nutritional cause d) Environmental cause

3) Complete immobilization of muscle leads to:
(Sahiwal Board-New Scheme-2014-

- A) a) Increase in capillaries
b) Increase in Mitochondria
c) Severe atrophy
d) Resistance to fatigue

4) Brain is protected by:
(Sahiwal Board-New Scheme-2014-A)

- a) Cranium b) Skull
c) Orbits d) Zygomatic bone

5) Mature bone cells are called as:
(Sahiwal Board-New Scheme-2015-

- A) a) Osteoblasts b) Osteocytes
c) Osteoclasts d) Chondrocytes

6) The type of nastic movement, which occurs in response to contact is called:
(Sahiwal Board-New Scheme-2015-

- A) a) Haptonastic b) Photonasty
c) Theronasty d) Nyctinasty

III) From Entry Test:-

1) Neck has ----- type of joint:(Entry Test-2007)

- a) Ball and socket c) Hinge
b) Pivot d) Fibrous

2) Which of the following belong to collenchyma cells?
(Entry Test-2007)

- a) Fibers c) Sclereides
b) Vessels d) None of these

3) Pick the paratonic movement from the following:
(Entry Test-2007)

- a) Nastic c) Growth
b) Turgor d) Tactic

4) Which of following is made up of bones and cartilage?
(Entry Test-2007)

- a) Endoskeleton c) Hydrostatic skeleton
b) Exoskeleton d) Both a and b

5) Which disease causes immobility and fusion of vertebral joint?
(Entry Test-2007)

- a) Sciatica c) Disc slip
b) Spondylosis d) Rickets

6) Which disease is caused by low calcium in the blood?
(Entry Test-2007)

- a) Tetany c) Muscle fatigue
b) Cramp d) Sciatica

7) Each muscle fiber is surrounded by a membrane which is called:
(Entry Test-2012)

- a) Sarcomere b) Sarcolemma c) Twitch fiber d) Capsule

8) When calcium ions are released from the sarcoplasmic reticulum they bind with ----- during muscle contraction:
(Entry Test-2012)

- a) Tropomyosin c) Cytosol's ions
b) Sarcomere d) Troponin

9) Human and mammalian skeleton can be divided into two parts, axial skeleton and:
(Entry Test-2012)

- a) Appendicular skeleton
b) Exoskeleton
c) Endoskeleton
d) Hydroskeleton

10) Last four vertebrae in humans are fused to form a structure called:
(Entry Test-2012)

- a) Sacrum c) Pubis
b) Cervical vertebrae d) Coccyx

11) How many bones are involved in the formation of each half of pelvic girdle:
(Entry Test-2012)

- a) 3 bones c) 2 bones
b) 4 bones d) 5 bones

12) Muscle fatigue is due to accumulation of:
(Self-Test Questions-2013)

- a) Lactic acid c) Glucose
b) ATP d) Fats

13) Diameter of skeletal muscle fiber is:
(Self-Test Questions-2013)

- a) 2-50 um c) 10-100 um
b) 30-90 um d) 1-80 um

14) Lining of digestive system contains the:
(Self-Test Questions-2013)

- a) Skeletal muscle c) Cardiac muscle
b) Skeletal and cardiac muscles d) Smooth muscle

15) The most abundant type of bone found on moveable joints is:
(Self-Test Questions-2013)

- a) Bone c) Fibro-cartilage
b) Hyaline cartilage d) Bone and fibro-cartilage

16) The vertebral column consists of:
(Self-Test Questions-2013)

- a) 33 c) 28
b) 30 d) 38

C h a p t e r ----
17

**COORDINATION
AND
CONTROL**
1 MCQ

I) From Exercise:-

- 1) **The neuron net of Hydra lacks:**
 - a) Neurons b) Dendrites
 - c) Connection d) **Direction of impulse flow**
- 2) **A nerve is a:**
 - a) Collection of neurons
 - b) Concentration of dendrites and axons
 - c) Bundle of axons or dendrites of neurons
 - d) **Bundle of axons or dendrites bounded by connective tissue**
- 3) **Thyroid glands produce:**
 - a) **T₃, T₄ and calcitonin**
 - b) Calcitonin
 - c) Tri-iodothyronine
 - d) Tetraiodothyronine
- 4) **What is the the number of cranial and spinal nerves in man:** (Multan Board-2009-A)
 - a) 12 and 31 b) **24 and 62**
 - c) Both a and b d) None of these
- 5) **The one which is not related to others is:** (Lahore Board-2008-A)
 - a) Cretinism b) Myxoedema
 - c) Exophthalmic goiter d) **Diabetes mellitus**

II) From Punjab Boards:-**LAHORE BOARD**

- 1) **The onset of epilepsy usually occurs before the age of:** (Lahore Board-2008-A)
 - a) 25 years b) 50 years
 - c) 60 years d) **30 years**
- 2) **Which one is not related to others?** (Lahore Board-2008-A)
 - a) Myxoedema b) **Diabetes**
 - c) Cretinism d) Exophthalmic goiter
- 3) **Abscisic acid promotes closing of stomata under conditions of:** (Lahore Board-2009-A)
 - a) **Water stress** b) Light stress
 - c) Temperature stress d) Wind stress
- 4) **The largest part of brain is:** (Lahore Board-2009-A)
 - a) Cerebellum b) **Cerebrum**
 - c) Medulla d) Thalamus
- 5) **Match diabetes incipidus with one of the following:** (Lahore Board-2010-A)
 - a) Oxytocin b) Vasopressin
 - c) Insulin d) **Glucagon**
- 6) **Kohler used chimpanzees to prove:** (Lahore Board-2010-A)
 - a) Habituation b) Imprinting
 - c) Latent learning d) **Insight learning**
- 7) **The hormone secreted by mucosa of the pyloric region of the stomach is:** (Lahore Board-2011-A)
 - a) **Gastrin** b) Secretin
 - c) Oestrogen d) Progesterone

- 8) **Which hormone in male stimulates the interstitial cells of testes to stimulate testosterone?** (Lahore Board-2011-A)
 - a) TSH b) FSH
 - c) **ICSH** d) LTH
- 9) **It is applied to Rubber plant to stimulate flow of Latex:** (Lahore Board-Group-I-(A)-2012)
 - a) Absciscic acid b) Gibberellin
 - c) **Ethene** d) Auxin
- 10) **Which one produced in excess, then leads to abnormal development called acromegaly:** (Lahore Board-Group-I-2012-A)
 - a) TSH b) ACTH
 - c) MSH d) **STH**
- 11) **Which is not a stimulus to release oxytocin:** (Lahore Board-Group-II-2012-A)
 - a) Distension of cervix
 - b) Decrease in progesterone level
 - c) Neural stimulation during parturition
 - d) **High level of Ca⁺⁺ ions**
- 12) **Rodents do not respond to alarm calls by others in their group, is an example of behavior termed as:** (Lahore Board-Group-II-2012-A)
 - a) Imprinting b) **Habituation**
 - c) Conditioning d) Latent learning
- 13) **The smaller number of alpha cells in pancreas secrete:** (Lahore Board-Group-I-2013-A)
 - a) Insulin b) **Glucagon**
 - c) Antidiuretic hormone (ADH)
 - d) Water
- 14) **Lack of vasopressin hormone causes:** (Lahore Board-Group-I-2013-A)
 - a) Diabetes mellitus b) **Diabetes insipidus**
 - c) Parkinson's disease d) Addison's disease
- 15) **Which hormone is chemically a steroid?** (Lahore Board-Group-II-2013-A)
 - a) ADH b) **Cortisone**
 - c) Thyroxine d) Insulin
- 16) **The hormone promotes closing of stomata:** (Lahore Board-Group-II-2013-A)
 - a) Auxin b) Gibberellin
 - c) **Abscisic acid** d) Cytokinin
- 17) **The simplest form of learning is:** (Lahore Board-Old Scheme-Group-II- 2014-A)
 - a) Imprinting b) Latent learning
 - c) **Habituation** d) Insight learning
- 18) **Excess MSH is secreted in:** (Lahore Board-Old Scheme-Group-II-2014-A)
 - a) **Addison's disease** b) Parkinson's disease
 - c) Grave's disease d) Alzheimer's disease

19) Maximum speed of nerve impulse transmission is:
(Lahore Board-New Scheme-Group-I-2014-

- A)
a) 100 m/sec b) 110 m/sec
c) 120 m/sec d) 130 m/sec

20) Ethene induce flowering in:
(Lahore Board-New Scheme-Group-II-2014-

- A)
a) Banana b) Rose
c) Pine-apple d) Orange

GUJRANWALA BOARD

1) The structural and functional unit of nervous system is called: (Gujranwala Board-2008-A)

- a) Neuron b) Receptor
c) Effector d) None of these

2) If plants are wounded, they form masses of amorphous material known as:
(Gujranwala Board-2008-

- A)
a) Etiolated b) Chlorosis
c) Calluses d) None of these

3) Which produce the sensation of pain?
(Gujranwala Board-2009-

- A)
a) Chemo-receptors b) Mechano-receptors
c) Nociceptors d) Thermo-receptors

4) What is the number of cranial and spinal nerves in man?
(Gujranwala Board-2009-A)

- a) 12 and 31 b) 24 and 46
c) 10 and 40 d) All of these

5) The simplest form of learning is:
(Gujranwala Board-2010-

- A)
a) Imprinting b) Habituation
c) Insight learning d) Latent learning

6) The corpuscles situated quite deep in the body, encapsulated neuron endings and receive deep pressure stimulus are:
(Gujranwala Board-2010-

- A)
a) Meissner's b) Pacinian
c) Nissal's d) White blood

7) The form of learning which involves a diminuation of response to repeated stimuli:
(Gujranwala Board-2011-

- A)
a) Imprinting b) Habituation
c) Latent learning d) Insight learning

8) Gastrin is a hormone produced by:
(Gujranwala Board (A)

- 2011)
a) Adrenals b) Pancreas
c) Gut d) Liver

9) Vasopressin (anti-diuretic hormone) and oxytocin are: (Gujranwala Board-2012-A)

- a) Proteins b) Amino acids and derivatives
c) Polypeptides d) Steroids

10) Nociceptors produce the sensation of:
(Gujranwala Board-2012-

- A)
a) Touch b) Warmth
c) Pressure d) Pain

11) Nociceptors produce the sensation of:
(Gujranwala Board-2013-

- A)
a) Touch b) Pain
c) Warmth d) Pressure

12) Absciscic acid can be sprayed on tree crops to regulate:
(Gujranwala Board-2013-A)

- a) Leaf drop b) Shoot drop
c) Cone drop d) Fruit drop

13) Endocrine glands secrete:
(Gujranwala Board-New Scheme-2014-

- A)
a) Hormones b) Salts
c) Enzymes d) Mucous

15) The cerebrospinal fluid (CSF) is similar in composition to:
(Gujranwala Board-New Scheme-2015-

- A)
a) Blood b) Blood plasma
c) Blood serum d) Blood proteins

MULTAN BOARD

1) Two cerebral hemispheres communicate with each other by means of a large band of axon:
(Multan Board-2008-

- A)
a) Axon b) Meninges
c) Hippocampus d) Corpus collasum

2) Development of secondary male characters in female is caused by: (Multan Board-2008-

- A)
a) Aldosterone b) Androgens
c) Cortisone d) Vasopressin

3) The cytoplasmic processes conducting impulse towards the neuron body are called:
(Multan Board-2008-

- S)
a) Dendrites b) Axon
c) Synapse d) Neuroglea

4) Alpha cells of pancreas secrete:
(Multan Board-2008-

- S)
a) Pancreatic b) Insulin
c) Glucagon d) Secretin

5) Which of the following is an example of neurotransmitter in man:
(Multan Board-2009-

- A)
a) Acetylcholine b) Serotonin
c) Dopamine d) All of these

6) Beta cells of pancreas secrete:

- (Multan Board-2009-
A)
a) Glucagon b) Glycogen
c) Lipase d) **Insulin**
- 7) What is the number of cranial and spinal nerves in man: (Multan Board-2009-A)
a) 12 and 31 b) **24 and 62**
c) Both a and b d) None of these
- 8) The imprinting form of behavior is best known in: (Multan Board-2009-
S)
a) **Birds** b) Mammals
c) Reptiles d) None of these
- 9) Chemically all of the following hormones are steroids except: (Multan Board-2009-S)
a) Oestrogen b) Testosterone
c) Cortisone d) **Oxytocin**
- 10) Flowering is induced in pine apple by growth hormone called: (Multan Board-2010-A)
a) Gibberellins b) Cytokinins
c) Absciscic acid d) **Ethene**
- 11) The structure in human brain which controls hunger is: (Multan Board-2010-A)
a) Amygdala b) Hippocampus
c) Thalamus d) **Hypothalamus**
- 12) Aldosterone hormone conserves the ion by preventing its loss from kidney tubules: (Multan Board-2010-S)
a) **Na⁺** b) K⁺
c) Mg⁺⁺ d) Ca⁺⁺
- 13) Testosterone is: (Multan Board-2010-S)
a) Amino acid b) Protein
c) **Steroid** d) Polypeptide
- 14) How many pairs of Cranial Nerves are in human being? (Multan Board-2011-A)
a) 8 pairs b) 10 pairs
c) **12 pairs** d) 14 pairs
- 15) Which hormone is also known as "Prolactin"? (Multan Board-2011-A)
a) TSH b) FSH
c) LH d) **LTH**
- 16) Flow of impulse through the nervous system, involving receptors, neurons and effectors is called: (Multan Board-2011-S)
a) Reflex action b) **Nerve impulse**
c) Reflex arc d) Simple reflex action
- 17) Which hormone stimulates the ripening of tomatoes and citrus fruits? (Multan Board-2011-S)
a) Auxins b) **Ethene**
c) Cytokinins d) Gibberellins

- 18) The main neurotransmitter for synapses that lie outside the central nervous system is: (Multan Board-2012-
A)
a) Adrenaline b) Serotonin
c) Dopamine d) **Acetylcholine**

- 19) Beneath the cranium, the brain and spinal cord are protected by triple layer of: (Multan Board-2012-
A)
a) **Meninges** b) Skin
c) Muscles d) CSF

- 20) A plant hormone that promotes cell enlargement behind the apical region of stem is: (Multan Board-2012-
S)
a) Gibberellins b) **Auxins**
c) Cytokinins d) Absciscic acid

- 21) Which of the pair is mismatched? (Multan Board-2012-
S)
a) Meissner corpuscles -- touch
b) Pacini corpuscles -----pressure
c) Stretch receptors----- Aortic arteries
d) **Nociceptors ----- Equilibrium**

- 22) Glucagon causes an increase in level of blood: (Multan Board-2013-
A)
a) **Glucose** b) Sucrose
c) Lactose d) Urea

- 23) The simplest of Learning Behavior is: (Multan Board-2013-
A)
a) Imprinting b) **Habituation**
c) Insight learning d) Latent learning

- 24) The maximum speed of nerve impulse per second in humans is: (Multan Board-Old Scheme-2014-A)
a) 100 meters b) **120 meters**
c) 130 meters d) 140 meters

- 25) Glucagon cause an increase in level of blood: (Multan Board-Old Scheme-2014-
A)
a) **Glucose** b) Sucrose
c) Lactose d) Urea

- 26) Nociceptors produce the sensation of: (Multan Board-New Scheme-2014-
A)
a) Touch b) **Pain**
c) Warmth d) Pressure

- 27) Diffused nervous system is found in: (Multan Board-New Scheme-2015-
A)
a) Poriferans b) Platyhelminthes
c) **Cnidarians** d) Annelids

BAHAWALPUR BOARD

- 1) It is believed that Oxytocin and A.D.H. is produced in: (Bahawalpur Board-2008-A)
a) **Hypothalamus** b) Hippocampus
c) Pons d) Cerebellum

- 2) Touch receptors are much more numerous in the:
(Bahawalpur Board-2009-
A) a) Arms b) Finger Tips
c) Palms d) Feet
- 3) What is the number of cranial and spinal nerves in man:
(Bahawalpur Board-2009-
A) a) 12 and 31 b) 24 and 62
c) Both a and b d) None of these
- 4) Cytokinins promote growth by cell division in:
(Bahawalpur Board-2009-
S) a) Apical meristem b) Cambium
c) Both a and b d) None of these
- 5) The concentrations of cell bodies of neurons are:
(Bahawalpur Board-2009-
S) a) Axons b) Ganglia
c) Dendrites d) Nodes
- 6) Medulla belongs to:
(Bahawalpur Board-2010-
A) a) Fore brain b) Mid brain
c) Hind brain d) Spinal cord
- 7) Selective weed killer is:
(Bahawalpur Board-2010-
A) a) 2-4 D b) IAA
c) NAA d) IPA
- 8) Nociceptors produce the sensation of:
(Bahawalpur Board-2010-
S) a) Taste b) Pain
c) Hearing d) Light
- 9) Which neurons have long axon?
(Bahawalpur Board-2011-
A) a) Sensory b) Motor
c) Associative d) Cell body
- 10) In human, Rely Centre is located in:
(Bahawalpur Board-2011-
A) a) Fore brain b) Mid brain
c) Hind brain d) Spinal cord
- 11) One of these detect changes in the environment of the animal:
(Bahawalpur Board (A) 2012)
a) Effectors b) Receptors
c) Neurons d) Muscles
- 12) It delays ripening and improves storage life of fruits:
(Bahawalpur Board-2012-
A) a) Gibberellins b) Cytokinins
c) Ethene d) Absciscic acid
- 13) Nervous system which prepares body for stressful activities:
(Bahawalpur Board-2013-A)
a) Sympathetic b) Somatic
c) Parasympathetic d) Central
- 14) The hormones which dilate blood vessel of skeletal muscles:
(Bahawalpur Board-2013-A)

- a) Cortisole b) Adrenaline
c) Noradrenaline d) Gastrin
- 15) The plant hormone which inhibits growth and promotes seed and bud dormancy is:
(Bahawalpur Board-New Scheme-2014-
A) a) Auxin b) Cytokinins
c) Absciscic acid d) Ethene
- 16) The hormone which controls male secondary sexual characteristics during puberty is:
(Bahawalpur Board-New Scheme-2014-
A) a) Insuline b) Testosterone
c) Oestrogen d) Progesterone
- 17) Promotes closing of Stomata under conditions of water stress:
(Bahawalpur Board-New Scheme-2015-
A) a) Ethene b) Absciscic acid
c) Gibberellins d) Cytokinins
- FAISALABAD BOARD**
- 1) Oxytocin hormone is produced by:
(Faisalabad Board-2008-
A) a) Pituitary gland b) Adrenal gland
c) Thyroid gland d) Parathyroid gland
- 2) Nociceptors produce sensation of:
(Faisalabad Board-2008-
A) a) Taste b) Hearing
c) Pain d) Light
- 3) Which is not growth stimulant?
(Faisalabad Board-2009-
A) a) Auxin b) Cytokinin
c) Gibbereline d) Absciscic acid
- 4) Parkinson's disease onset usually at the age of:
(Faisalabad Board-2010-
A) a) 40's b) 30's
c) 50's d) 50's and 60's
- 5) Absciscic acid promotes closing of stomata under conditions of:
(Faisalabad Board-2010-
A) a) Water stress b) Light stress
c) Temperature stress d) Wind stress
- 6) The main neurotransmitter of brain is:
(Faisalabad Board-2011-
A) a) Insulin b) Aldosterone
c) Serotonin d) Acetylcholine
- 7) In pineapple, flowering may be induced by:
(Faisalabad Board-2011-
A) a) Ethene b) Auxins
c) Gibberellins d) Cytokinnins
- 8) In humans, the pairs of cranial nerves are:
(Faisalabad Board-2012-
A) a) 12 b) 14
c) 16 d) 18
- 9) Hind brain includes the medulla, pons and:

(Faisalabad Board-2012-

- A) a) Cerebrum b) Cerebellum
c) Thalamus d) Amygdala
- 10) The structures which respond by the impulse coming from the motor neurons are called:

(Faisalabad Board-2013-

- A) a) Receptors b) Sensory neurons
c) Motor neurons d) Effectors
- 11) The maximum speed of nerve impulses in human being recorded is:

(Faisalabad Board-2013-

- A) a) 100 m/sec b) 120 m/sec
c) 140 m/sec d) 160 m/sec

- 12) Which promotes fruit ripening?

(Faisalabad Board-Old Scheme-2014-

- A) a) Cytokinins b) Ethene
c) Absciscic acid d) Gibberellins

- 13) Secretin is an important hormone of:

(Faisalabad Board-Old Scheme-2014-

- A) a) Pancreas b) Gut
c) Liver d) Esophagus

- 13) All are related to medulla oblongata, except:

(Faisalabad Board-New Scheme-2014-

- A) a) Long term memory b) Breathing rate
c) Heart beat rate d) Blood pressure

- 14) During non-conducting state, the neuron membrane is permeable to efflux of:

(Faisalabad Board-New Scheme-2015-

- A) a) K⁺ b) Na⁺
c) Ca⁺⁺ d) Cl⁻

RAWALPINDI BOARD

- 1) The cold receptors in human beings are nearly more abundant than heat receptors:

(Rawalpindi Board-2010-

- A) a) 27 times b) 15 times
c) 10 times d) 20 times

- 2) The maximum speed of nerve impulse recorded in human beings is:

(Rawalpindi Board-2010-A)

- a) 120 m/sec b) 100 m/sec
c) 150 m/sec d) 200 m/sec

- 3) Kohler performed many experiments to show:

(Rawalpindi Board-2011-

- A) a) Latent learning b) Imprinting
c) Habituation d) Insight learning

- 4) Secretin is a hormone produced by:

(Rawalpindi Board-2011-

- A) a) Liver b) Gut
c) Pancreas d) Adrenals

- 5) Absciscic acid can be sprayed on tree to regulate:

(Rawalpindi Board-2012-

- A) a) Leaf drop b) Shoot drop
c) Cone drop d) Fruit drop

- 6) Gastrin stimulates the secretion of:

(Rawalpindi Board-2012-

- A) a) Saliva b) Intestinal juice
c) Gastric juice d) Pancreatic juice

- 7) Antidiuretic hormone is also called as:

(Rawalpindi Board-2013-

- A) a) Oxytocin b) ACTH
c) Vasopressin d) Prolactin

- 8) 2,4 D kills broad leaved:

(Rawalpindi Board-2013-

- A) a) Monocots b) Dicots
c) Ferns d) Gymnosperms

- 9) Nociceptors produce sensation of:

(Rawalpindi Board-New Pattern-2014-

- A) a) Touch b) Warmth & cold
c) Smell d) Pain

- 10) Which of the hormone suppresses ovulation:

(Rawalpindi Board-New Pattern-2015-

- A) a) Testosterone b) Oestrogen
c) Gastrin d) Progesterone

SARGODHA BOARD

- 1) Which hormone is used for fruit ripening?

(Sargodha Board-2010-

- A) a) Auxin b) Cytokinin
c) Gibberellins d) Ethene

- 2) Galls are growth on plants that are induced by:

(Sargodha Board-2010-

- A) a) Parasites b) Saprophytes
c) Predator d) Lichens

- 3) Absciscic acid promotes closing of stomata under conditions of stress of:

(Sargodha Board-2011-

- A) a) Light b) Water
c) Wind d) Temperature

- 4) The main transmitter for synapses that lie outside the central nervous system is:

(Sargodha Board-2011-

- A) a) Adrenaline b) Dopamine
c) Acetylcholine d) Serotonin

- 5) The largest part of brain is:

(Sargodha Board-2012-

- A) a) Cerebellum b) Medulla
c) Thalamus d) Cerebrum

- 6) The main neurotransmitter for synapsis that lies outside central nervous system:

(Sargodha Board-2012-

- A) a) Serotonin b) Acetylcholine
c) Dopamine d) Adrenaline

- 7) Which one of the following substitute for red light:

(Sargodha Board-2013-

- A) a) Auxin b) Gibberellins

- c) Cytokinins d) Ethene
 8) How many receptors are present in skin?
 (Sargodha Board-2013-
 A)
 a) Three types b) Six types
 c) Five types d) Two types

DERA GHAZI KHAN BOARD

- 1) Nociceptors produce the sensation of:
 (Dera Ghazi Khan Board-2009-
 A)
 a) Pain b) Light
 c) Taste d) Hearing
 2) Chemically cortisone is:
 (Dera Ghazi Khan Board-2009-
 A)
 a) An amino acid b) A protein
 c) Steroid d) Polypeptide
 3) The structure which receives information from skin is:
 (Dera Ghazi Khan Board-2010-
 A)
 a) Hypothalamus b) Thalamus
 c) Amygdala d) Hippocampus
 4) The hormone which inhibits root growth is:
 (Dera Ghazi Khan Board-2010-
 A)
 a) Auxins b) Gibberellins
 c) Cytokinins d) Absciscic acid
 5) In living things, the behavioral activities occur at intervals, which are called:
 (Dera Ghazi Khan Board-2011-
 A)
 a) Diurnal rhythm b) Circannual
 c) Biorhythms d) Circadian
 6) The hormone which promotes bolting of some rosette plants is known as:
 (Dera Ghazi Khan Board-2011-
 A)
 a) Auxins b) Cytokinins
 c) Ethene d) Gibberellins
 7) Which one of the following hormones promotes stomatal opening?
 (D.G.K Board-Group-I-2012-
 A)
 a) Auxin b) Gibberellin
 c) Cytokinin d) Ethene
 8) During non-conducting state, the neuron membrane is permeable to efflux of:
 (D.G.K Board-Group-I-2012-
 A)
 a) K^+ b) Na^+
 c) Cl^- d) Ca^{++}
 9) Hormone antagonistic to parathormone is:
 (D.G.K Board-Group-II-2012-
 A)
 a) Oxytocin b) Thyroxine
 c) Calcitonin d) Cortisone

- 10) Learning associated with indifferent situation without reward: (D.G.K Board-Group-II-2012-
 A)
 a) Insight learning b) Latent learning
 c) Imprinting d) Habituation
 11) Hormone inhibits hydrolysis of glycogen in liver and muscles: (D.G.K Board-Group-I-2013-
 A)
 a) Insulin b) Glucagon
 c) Cortisol d) Secretin
 12) Kohler used chimpanzee to prove:
 (D.G.K Board-Group-I-2013-
 A)
 a) Habituation b) Imprinting
 c) Insight learning d) Latent learning
 13) Which one of the following promotes fruit ripening:
 (D.G.K Board-Group-II-2013-
 A)
 a) Auxins b) Cytokinins
 c) Gibberellins d) Ethene
 14) The normal speed of nerve impulse in human beings is:
 (D.G.K Board-Group-II-
 2013)
 a) 100 m/sec b) 110 m/sec
 c) 120 m/sec d) 130 m/sec
 15) Galls are growth on a plant that are induced by:
 (D.G.K Board-New Scheme-Group-I-2014-
 A)
 a) Ticks b) Protozoans
 c) Parasites d) Fungi
 16) A nerve is:
 (D.G.K Board-New Scheme-Group-II-2014-
 A)
 a) Collection of neurons
 b) Bundle of axons or dendrites
 c) Concentration of dendrites and axons
 d) Bundle of axons or dendrites bounded by connective tissue
 17) In neurons the message is transmitted across synapse in the form of chemical messenger called:
 (D.G.K Board-New Scheme-Group-I-2015-
 A)
 a) Neurotransmitters b) Communication
 c) Nerve impulse d) Synaptic vesicle
 18) The number of spinal nerve in man is:
 (D.G.K Board-New Scheme-Group-II-2015-
 A)
 a) 24 b) 62
 c) 12 d) 31

SAHIWAL BOARD

- 1) The structure in human brain which control hunger is:
 (Sahiwal Board-2013-
 A)
 a) Amygdala b) Hippocampus
 c) Thalamus d) Hypothalamus
 2) Development of secondary sexual characteristics in female is caused by:
 (Sahiwal Board-2013-
 A)
 a) Aldosterone b) Cortisone
 c) Oestrogen d) Vasopressin
 3) Which one is not related to others:

(Sahiwal Board-New Scheme-2014-

- A) a) Cretinism b) Myxoedema
c) Exophthalmic goiter d) Diabetes mellitus
- 4) Apical dominance is caused by:

(Sahiwal Board-New Scheme-2014-

- A) a) Gibberellins b) Cytokinins
c) Ethene d) Auxins
- 5) In myelinated neurons, the impulse jumps from node to node and is called:

(Sahiwal Board-New Scheme-2015-

- A) a) Saltatory impulse b) Nerve impulse
c) Synapse d) Synapsis

III) From Entry Test:-

- 1) Which of the following receptors produce sensation of pain? (Entry Test-2007)
- a) Mechanoreceptors c) Chemoreceptors
b) Nociceptors d) Thermoreceptors
- 2) When your finger accidentally gets caught in a door, pain message is sent to your brain through -----: (Entry Test-2007)
- a) Homeostasis c) Caffeine
b) Sensory receptors d) Medulla
- 3) Which of the following promotes leaf and fruit growths? (Entry Test-2007)
- a) Auxins c) Abscissic acid
b) Gibberellins d) Ethane
- 4) Which of the following controls several automatic functions like breathing, heart rate, and blood pressure? (Entry Test-2007)
- a) Midbrain c) Medulla
b) Pons d) Cerebellum
- 5) This disease is characterized by decline in brain function: (Entry Test-2007)
- a) Alzheimer's disease c) Epilepsy
b) Parkinson's disease d) None of these
- 6) Which hormone continues to promote protein synthesis throughout the body even after the cease in growth? (Entry Test-2007)
- a) TSH c) ACTH
b) ADH d) STH
- 7) The part of neuron fiber which conducts nerve impulse away from the cell body is: (Entry Test-2012)
- a) Dendron c) Axon
b) Dendrites d) Peripheral branch
- 8) Cause of Parkinson's disease is death of brain cells that produce: (Entry Test-2012)

- a) Dopamine c) ADH hormone
b) Accetylcholine d) Oxytocin

- 9) The number of cranial nerves in humans is: (Entry Test-

- 2012)
- a) 21 pairs c) 24 pairs
b) 12 pairs d) 62 pairs

- 10) The part of brain which controls breathing, heart rate, and swallowing is: (Entry Test-

- 2012)
- a) Cerebrum c) Medulla
b) Cerebellum d) Hypothalamus

- 11) Ductless glands are known as: (Entry Test-2012)

- a) Endocrine glands c) Salivary glands
b) Exocrine glands d) Site glands

- 12) Gastrin is the hormone which is produced by the: (Entry Test-

- 2012)
- a) Liver c) Pyloric region of stomach
b) Adrenal gland d) Mucosal lining of intestine

- 13) β cells of pancreas secrete a hormone that is called: (Entry Test-

- 2012)
- a) Insulin c) Antidiuretic hormone
b) Glucagon d) Gastrin

- 14) Vasopressin and Oxytocin are released from the: (Entry Test-

- 2012)
- a) Placenta c) Anterior pituitary
b) Ovaries d) Posterior pituitary

- 15) Which of the following is a hormone: (Self-Test Questions-

- 2013)
- a) Gastric juice c) Bile
b) Pancreatic d) Insulin

- 16) The hormones in the human body are produced by: (Self-Test Questions-

- 2013)
- a) Brain only c) Pancreas only
b) Liver only d) Different endocrine glands

- 17) Insulin is a hormone produced by: (Self-Test Questions-

- 2013)
- a) Thyroid gland c) Adrenal gland
b) Parathyroid d) Pancreas

- 18) The hormone called Parathormone regulates calcium level in the blood. This hormone is produced by: (Self-Test Questions-

- 2013)
- a) Gonads c) Thyroid gland
b) Gut d) Parathyroid

- 19) Mechanoreceptors detect stimulus of: (Self-Test Questions-

- 2013)

- a) Smell (touch) b) Light warmth
c) Pressure d) Cold and warmth
- 20) The effectors in the human body which respond to a stimulus are: (Self-Test Questions-2013)
- a) Glands only b) Muscles only c) Both muscles and glands d) Bones
- 21) Loss of memory (Dementia) is also known as: (Self-Test Questions-2013)
- a) Alzheimer's disease b) Epilepsy c) Parkinson's disease d) Graves disease
- 22) A mix nerve consists of: (Self-Test Questions-2013)
- a) Motor and sensory nerve fibers
b) Sensory and associative nerve fibers
c) Motor and associative nerve fibers
d) Dendrons and dendrites

C h a p t e r ----

18

REPRODUCTION

2 MCQs

I) From Exercise:-

- 1) Reproduction is very important to the survival of: (Multan Board-2008-)
- S)
- a) Species b) Individual
c) Population d) Both a and b
- 2) In plants photoperiod and temperature affect:
- a) Flowering
b) Buds and seed dormancy
c) Fruit and seed production
d) All a, b, c
- 3) Developing seeds are rich source of:
- a) Auxins b) Cytokinin
c) Gibberellins d) All a, b, c
- 4) Common methods of sexual reproduction are:
- a) Tissue culture b) Identical twins
c) Cloning d) All a, b, c
- 5) Photoperiod affects flowering when shoot meristem starts producing:
- a) Floral buds b) Leaves
c) Lateral buds d) Both b and c

II) From Punjab Boards:-

LAHORE BOARD

- 1) During delivery in human females, the average loss of blood is about: (Lahore Board-2008-A)
- a) 250 cm³ b) 350 mm³
c) 350 cm³ d) 250 mm³
- 2) The first convoluted part of vas deference is called:

(Lahore Board-2008-

- A)
- a) Epididymis b) Seminiferous tubules
c) Ureter d) Scrotum
- 3) During delivery in humans, the average loss of blood is about: (Lahore Board-2009-A)
- a) 150 cm³ b) 250 cm³
c) 350 cm³ d) 450 cm³
- 4) The first convoluted part of vas deference is called:

(Lahore Board-2010-

- A)
- a) Epididymis b) Penis
c) Scrotum d) Sperm
- 5) When will you call the embryos as fetus: (Lahore Board-2010-

- A)
- a) After two months b) After three months
c) After four months d) After five months
- 6) In human female, the discharge of blood and cell debris is called: (Lahore Board-2011-A)

- a) Ovulation b) Abortion
c) Menstruation d) Secretion
- 7) Corpus luteum starts secreting a hormone called: (Lahore Board-2011-

- A)
- a) Estrogen b) Progesterone
c) Oxytocin d) Testosterone

- 8) Ovoviviparity is shown by: (Lahore Board-Group-I-2012-

- A)
- a) Reptile b) Bird
c) Duckbill platypus d) Human
- 9) Which one secretes to protect and nourish sperm cells: (Lahore Board-Group-I-2012-A)

- a) Corpus luteum b) Sertoli cells
c) Placenta d) Epididymis

- 10) Example of day neutral plant is: (Lahore Board-Group-II-2012-

- A)
- a) Tomato b) Soyabean
c) Xanthium d) Chrysanthimum

- 11) Corpus luteum secretes a hormone: (Lahore Board-Group-II-2012-

- A)
- a) FSH b) LH
c) Progesterone d) Estrogen

- 12) Which cells secrete testosterone? (Lahore Board-Group-I-2013-

- A)
- a) Prostate glands b) Seminal vesicle
c) Interstitial cells d) Follicle cells

- 13) Which hormone is necessary for fruit set: (Lahore Board-Group-I-2013-

- A)
- a) Auxins b) Gibberellins
c) Cytokinins d) Ethene

- 14) Hormone absent in developing seed: (Lahore Board-Group-II-2013-

A)

- a) Auxins b) Gibberellins
c) Absciscic acid d) Ethene
- 15) Which one is a haploid cell:
(Lahore Board-Group-II-2013-
A)
a) Oogonia b) Primary oocyte
c) Secondary oocyte d) Zygote
- 16) Mammals are:
(Lahore Board-Old Scheme-Group-II-2014-
A)
a) Oviparpus b) Ovoviviparous
c) Both a and b d) Viviparous
- 17) P660 is converted to active P730 by absorption of:
(Lahore Board-Old Scheme-Group-II-2014-
A)
a) Blue light b) Red light
c) Orange light d) Far red light
- 18) Reproduction is necessary for the survival of:
(Lahore Board-New Scheme-Group-I-2014-
A)
a) Individual b) Species
c) Community d) Biome
- 19) Vehicle for transport of male gamete in land plants is:
(Lahore Board-New Scheme-Group-I-2014-
A)
a) Water b) Pollen tube
c) Pollen grain d) Wind
- 20) Parthenocarpy is induced in tomato and pepper by adding:
(Lahore Board-New Scheme-Group-II-2014-
A)
a) Auxin b) Cytokinin
c) Ethene d) Absciscic acid
- 21) Average loss of blood during birth in human female is about:
(Lahore Board-New Scheme-Group-II-2014-
A)
a) 150 cm³ b) 250 cm³
c) 350 cm³ d) 450 cm³

GUJRANWALA BOARD

- 1) Fruit development proceeds without fertilization and no seed formation takes place is called:
(Gujranwala Board-2008-
A)
a) Parthenocarpy b) Seed dormancy
c) Photoperiodism d) None of these
- 2) In human female during birth the average loss of blood is about ----- cm³:
(Gujranwala Board-2009-
A)
a) 250 b) 350
c) 450 d) 150
- 3) Ovary under the stimulus of FSH also produces a hormone i.e. (Gujranwala Board-2010-
A)

- a) Progesterone b) Estrogen
c) Oxytocin d) Corticosteroid
- 4) The duration of gestation period in human female is usually:
(Gujranwala Board-2011-
A)
a) 250 days b) 260 days
c) 270 days d) 280 days
- 5) A light sensitive pigment found in plant cells is called:
(Gujranwala Board-2011-
A)
a) Cytochrome b) Phytochrome
c) Photochrome d) Auxin
- 6) Reptiles and birds are:
(Gujranwala Board-2012-
A)
a) Viviparous b) Oviparous
c) Ovoviviparous d) Marsupials
- 7) In nature, P730 to P660 conversion occurs in the:
(Gujranwala Board-2012-
A)
a) Day b) Red light
c) Dark d) Dawn
- 8) The duration of low temperature (chilling) treatment varies from:
(Gujranwala Board-2013-
A)
a) 4 days to 2 months b) 4 days to 3 months
c) 2 days to 3 months d) 5 days to 5 months
- 9) During delivery in humans, the average loss of blood is about:
(Gujranwala Board-2013-
A)
a) 150 cm³ b) 250 cm³
c) 350 cm³ d) 450 cm³
- 10) Fruit ripening is due to the production of:
(Gujranwala Board-New Scheme-2014-
A)
a) Auxins b) Cytokinin
c) Gibberellin d) Ethene
- 11) Tobacco plant produces flowers in:
(Gujranwala Board-New Scheme-2014-
A)
a) Spring b) Summer
c) Autumn d) Winter
- 12) Fruit development without fertilization is -----:
(Gujranwala Board-New Scheme-2015-
A)
a) Dormancy b) Climacteric
c) Parthenocarpy d) Parthenogenesis

- 13) Which is a long day plant?
(Gujranwala Board-New Scheme-2015-
A)
a) Cucumber b) Henbane
c) Soyabean d) Strawberry

MULTAN BOARD

- 1) Germ cells in the ovary produce many:
(Multan Board-2008-
A)
a) Spermatogonia b) Zoospores
c) Zygospores d) Oogonia
- 2) Reproduction is ver important for survival of:

- (Multan Board-2008-
S)
a) Individual b) Species
c) Population d) Both b and c
- 3) Which hormone releases ovum from the ovary?
(Multan Board-2008-
S)
a) LH b) FSH
c) ADH d) LTH
- 4) The term pericarp refers to:
(Multan Board-2009-
A)
a) Seed wall b) Fruit wall
c) Cell wall d) Cell membrane
- 5) The long day plants produce flowers in presence of phytochrome:
(Multan Board-2009-
S)
a) P-730 b) P-660
c) P-700 d) P-600
- 6) A long day plant with its critical day length as 11.0 hours is the:
(Multan Board-2010-
A)
a) Cabbage b) Snapdragon
c) Barley d) Henbane
- 7) The increase in level of estrogen stimulates secretion of:
(Multan Board-2010-
A)
a) Estrogen b) Progesterone
c) LH d) FSH
- 8) Syphilis is caused by:
(Multan Board-2010-
S)
a) Gram positive bacteria b) Spirochete
c) Types 2 virus d) Sexual contact
- 9) In flowering plants, one form of parthenogenesis is called:
(Multan Board-2010-
S)
a) Vernalisation b) Photoperiodism
c) Apomixis d) Metamorphosis
- 10) The Sac-like Scortum is present in:
(Multan Board-2011-
A)
a) Ovary b) Testis
c) Lung d) Kidney
- 11) Which one is the method of Sexual Reproduction in the following?
(Multan Board-2011-
A)
a) Fission b) Sporulation
c) Budding d) Conjugation
- 12) The special condition of rest, which enables an embryo to survive the long periods of unfavorable conditions is called:
(Multan Board-2011-
S)
a) Bud dormancy b) Leaf dormancy
c) Stem dormancy d) Seed dormancy
- 11) The total gestation period in human female is usually:
(Multan Board-2011-
S)
a) 280 days b) 270 days
c) 265 days d) 260 days

- 12) Corpus luteum, after its development, start secreting a hormone called:
(Multan Board-2012-
A)
a) Estrogen b) Testosterone
c) Progesterone d) Oxytocin
- 13) From the beginning of 3rd month of pregnancy, the human embryo is referred to as:
(Multan Board-2012-
A)
a) Kid b) Kitten
c) Baby d) Fetus
- 14) *Hyoscyamus niger* is an example of:
(Multan Board-2012-
S)
a) Long day plants b) Short day plants
c) Day neutral plants d) Both a and b
- 15) In honey bee, sperms are produced by:
(Multan Board-2012-
S)
a) Meiosis b) Mitosis
c) Parthenogenesis d) Apomixis
- 16) Reptiles and birds are:
(Multan Board-2013-
A)
a) Oviparous b) Viviparous
c) Viviparity d) Ovoviviparous
- 17) Fruit ripening is often accompanied by
(Multan Board-2013-
A)
a) Dimetric b) Climax
c) Climacteric d) Trimetric
- 18) In all female mammals except human being desire for mating is called:
(Multan Board-Old Scheme-2014-
A)
a) Heat b) Cold
c) Menopause d) Gestation
- 19) In honey bee male sperms are produced by:
(Multan Board-Old Scheme-2014-
A)
a) Pathenogenesis b) Apomixis
c) Mitosis d) Meiosis
- 20) Developing seeds are rich source of:
(Multan Board-New Scheme-2014-
A)
a) Auxins b) Gibberellins
c) Cytokinins d) All these
- 21) During delivery in human the average loss of blood is:
(Multan Board-New Scheme-2014-
A)
a) 150 cm³ b) 250 cm³
c) 350 cm³ d) 450 cm³
- 22) ----- is a long day plant:
(Multan Board-New Scheme-2015-
A)
a) Soyabean b) Henbane
c) Tomato d) Cucumber
- 23) Photoperiod affects flowering when shoot meristems start producing:
(Multan Board-New Scheme-2015-
A)

- a) **Floral buds** b) Leaves
c) Lateral buds d) Branches

BAHAWALPUR BOARD

1) Oestrus cycle, a reproductive cycle, is found in all female mammals except:

(Bahawalpur Board-2008-

- A) a) Cat b) Cow
c) **Human being** d) Lion
2) Red light inhibits flowering in:

(Bahawalpur Board-2008-

- A) a) **Short day plants** b) Long day plants
c) Day neutral plants d) None of these
3) Developing seeds are rich source of:

(Bahawalpur Board-2009-

- A) a) Auxins b) Cytokinin
c) Gibberellins d) **All a, b, c**
4) Luteinizing hormone induces:

(Bahawalpur Board-2009-

- S) a) Flowering b) **Ovulation**
c) Lactation d) Menopause
5) Humal female has gestation period of:

(Bahawalpur Board-2010-

- A) a) 200 days b) 240 days
c) 260 days d) **280 days**
6) The hormone florigen is produced in:

(Bahawalpur Board-2010-

- S) a) Root b) **Leaves**
c) Stem d) Floral bud
7) Male prothallus in angiosperm after pollination develops from:

(Bahawalpur Board-2010-

- S) a) Megaspore b) Oosphere
c) **Microspore** d) Zygote
8) Oviduct opens into:

(Bahawalpur Board-2011-

- A) a) **Uterus** b) Ureter
c) Ovary d) Vagina
9) Which one is not Parthenogenic Fruit:

(Bahawalpur Board-2011-

- A) a) Banana b) Pineapple
c) Grape d) **Mango**
10) Gonorrhea is caused by a:

(Bahawalpur Board-2012-

- A) a) **Neisseria** b) *T. pallidum*
c) Herpes simplex d) *Clostridium*
11) Tomato and Cucumber are examples of:

(Bahawalpur Board-2012-

- A) a) Short day plants b) Long day plants
c) **Day Neutral plants** d) None of these
12) Henbane and Cabbage are examples of:

(Bahawalpur Board-2012-

- A) a) Short Day Plants b) **Long Day Plants**

- c) Day Neutral Plants d) None of these

13) Light promotes germination of fern spores:
(Bahawalpur Board-2013-

- A) a) White b) Blue
c) Green d) **Red**
14) Sperms of Honey Bee males are the products of:

(Bahawalpur Board-2013-

- A) a) **Mitosis** b) Meiosis
c) Parthenogenesis d) Apomixix
15) In tomato and peppers, parthenocarp is artificially induced by adding:

(Bahawalpur Board-New Scheme-2014-

- A) a) Auxins b) Cytokinins
c) Absciscic acid d) Ethane
16) The human embryo is referred to as the fetus, from the beginning of:

(Bahawalpur Board-New Scheme-2015-

- A) a) **3rd month** b) 3rd week
c) 6th month d) 6th week
17) The total gestation period (Pregnancy) is usually about:

(Bahawalpur Board-New Scheme-2015-

- A) a) 250 days b) 260 days
c) 270 days d) **280 days**

FAISALABAD BOARD

1) Temperature around 4°C stimulates production of:
(Faisalabad Board-2009-

- A) a) Floregin b) **Vernalin**
c) Auxin d) Ethene
2) Oviduct opens into:

(Faisalabad Board-2009-

- A) a) Vagina b) **Uterus**
c) Cervix d) Urethra
3) In human female, uterine tube opens into:

(Faisalabad Board-2010-

- A) a) Ovary b) **Uterus**
c) Vagina d) Cervix
4) Haploid males produce sperms by mitosis:

(Faisalabad Board-2010-

- A) a) Hydra b) Earthworm
c) **Honey bee** d) Man
5) Identify the day neutral plant:

(Faisalabad Board-2011-

- A) a) Cabbage b) **Cotton**
c) Tobacco d) Cocklebur
6) During oogenesis, total non-disjunction of chromosomes occur in:

(Faisalabad Board-2011-

- A) a) Queen bees b) Ants
c) Wasps d) **Aphids**
7) The cells provide liquid medium for protection and

nourishment to sperm: (Faisalabad Board-2013-

- A)
a) Placenta b) Epididymis
c) Sertoli d) Vas deference

8) The total gestation period in human female is about: (Faisalabad Board-2013-

- A)
a) 28 days b) 120 days
c) 180 days d) 280 days

9) Syphilis is caused by: (Faisalabad Board-Old Scheme-2014-

- A)
a) Sexual contact b) Gram positive bacteria
c) Spirochete d) HIV

10) Between seminiferous tubules are interstitial cells,

which secrete:

(Faisalabad Board-New Scheme-2014-

- A)
a) Estrogen b) Testosterone
c) Aldosterone d) Corticosteroids

11) The long day plants produce flowers in presence of

phytochrome:

(Faisalabad Board-New Scheme-2014-

- A)
a) P—660 b) P—770
c) P—730 d) P—660

12) Reroduction is very important for the survival of:

(Faisalabad Board-New Scheme-2015-

- A)
a) Individual b) Species
c) Biosphere d) Ecosystem

13) Which hormone induces labour pain?

(Faisalabad Board-New Scheme-2015-

- A)
a) Estrogen b) Oxytocin
c) Progesterone d) LTH

RAWALPINDI BOARD

1) All of the following are Day neutral plants except:

(Rawalpindi Board-2010-

- A)
a) Tomato b) Maize
c) Cotton d) Wheat

2) Germinating pollen grain is rich source of:

(Rawalpindi Board-2011-

- A)
a) Gibberellins b) Auxins
c) Absciscic acid d) Cytokinin

3) Oviparous animals: (Rawalpindi Board-2011-

- A)
a) Lay eggs b) Give birth to young
c) Give larvae d) Give pupae

4) Lutenizing hormone induces:

(Rawalpindi Board-2012-

- A)
a) Flowering b) Ovulation
c) Vernalization d) Menopause

5) Plant hormone florigen is produced in:

(Rawalpindi Board-2012-

- A)
a) Flower b) Root
c) Stem d) Leaves

6) Oviduct is generally called as:

(Rawalpindi Board-2013-

- A)
a) Fallopian tube b) Uterine tube
c) Both a and b d) Uterus

7) Fruit ripening is often accompanied by a burst of respiratory activity, called the:

(Rawalpindi Board-2013-

- A)
a) Fertilization b) Photoperiod
c) Climacteric d) Reproduction

8) Second meiotic division in oocytes, until fertilization

proceeds as far as:

(Rawalpindi Board –New Pattern-2014-

- A)
a) Prophase b) Metaphase
c) Anaphase d) Telophase

9) Human embryo remains enclosed in a sac called:

(Rawalpindi Board –New Pattern-2014-

- A)
a) Placenta b) Chorionic sac
c) Amniotic sac d) Egg shell

10) Reproduction is very important to the survival of:

(Rawalpindi Board –New Pattern-2015-

- A)
a) Species b) Individual
c) Community d) Both a and b

11) External fertilization occurs in:

(Rawalpindi Board –New Pattern-2015-

- A)
a) Terrestrial environment
b) Aquatic environment
c) The reproductive tract of female
d) None

SARGODHA BOARD

1) Oviduct opens into: (Sargodha Board-2010-

- A)
a) Uterus b) Vagina
c) Ovary d) Urethra

2) An external genitalia very sensitive during copulation is:

(Sargodha Board-2010-

- A)
a) Placenta b) Clitoris
c) Uterus d) Cervix

3) The condition in which biennial and perennial plants are stimulated to flower by exposure to low temperature is called:

(Sargodha Board-2011-

- A)
a) Photoperiodism b) Florigenation
c) Chilling d) Vernalization

4) Decrease of FSH and increase of estrogen causes the pituitary gland to secrete:

(Sargodha Board-2011-

- A)
a) Luteotropic hormone b) Luteinizing hormone

- c) Vasopressin d) Oxytocin
 5) In honey bee male sperms are produced by:
 (Sargodha Board-2012-
 A)
 a) Mitosis b) Meiosis
 c) Pathenogenesis d) Binary fission
 6) During delivery in human the average loss of blood is about:
 (Sargodha Board-2012-
 A)
 a) 150 cm³ b) 250 cm³
 c) 350 cm³ d) 450 cm³
 7) Which one of the following is day neutral plant:
 (Sargodha Board-2013-
 A)
 a) Cotton b) Cabbage
 c) Snapdragon d) Strawberry
 8) Unhooking of plumule is promoted by:
 (Sargodha Board-2013-
 A)
 a) Red light b) Blue light
 c) Ultra violet rays d) Both b and c

DERA GHAZI KHAN BOARD

- 1) All of the following are short day plants except:
 (Dera Ghazi Khan Board-2009-
 A)
 a) Soybean b) Henbane
 c) Tobacco d) Cocklebur
 2) A short day plant with its critical day length as 8.5 hours is:
 (Dera Ghazi Khan Board-2010-
 A)
 a) Cabbage b) Cocklebur
 c) Cotton d) Wheat
 3) Syphilis is caused by a spirochete named as:
 (Dera Ghazi Khan Board (A)
 2011)
 a) *Nisseria gonorrhoea* b) *Tripinema*
palladium
 c) *Escherechia coli* d) *Hyphmicrobium*
 4) The Hormone responsible for production of sperm cells and male secondary sexual characteristics during puberty is:
 (Dera Ghazi Khan Board-2011-
 A)
 a) Progesterone b) Thyroxine
 c) Testosterone d) Estrogens
 5) In which of the following, sporophyte is completely dependent upon the gametophyte?
 (D.G.K Board-Group-I-2012-
 A)
 a) Gymnosperms b) Angiosperms
 c) Bryophytes d) Thallophtyes
 6) Haploid parthenogenesis is present in:
 (D.G.K Board-Group-I-2012-
 A)

- a) Wasp b) Bee
 c) Aphid d) Ants
 7) During night, plants contain more phytochromes in the form of:
 (D.G.K Board-Group-II-2012-
 A)
 a) P600 b) P660
 c) P700 d) P730
 8) Males of honey bee are:
 (D.G.K Board-Group-II-2012-
 A)
 a) Haploids b) Diploids
 c) Triploids d) Polyploids
 9) Plant hormones, florigen is produced in:
 (D.G.K Board-Group-I-2013-
 A)
 a) Flowers b) Roots
 c) Leaves d) Stem
 10) The cells which nourish sperm cells:
 (D.G.K Board-Group-I-2013-
 A)
 a) Interstitial b) Sertoli
 c) Epidermis d) Zygote
 11) The average loss of blood during and after birth is:
 (D.G.K Board-Group-II-2013-
 A)
 a) 250 cm³ b) 300 cm³
 c) 350 cm³ d) 400 cm³
 12) Which of the following plant is day neutral:
 (D.G.K Board-Group-II-2013-
 A)
 a) Henbane b) Cocklebur
 c) Cabbage d) Tomato
 13) Parthenocarpy is the development of fruit without:
 (D.G. K. Board-New Scheme-Group-I-2014-
 A)
 a) Pollination b) Germination
 c) Fertilization d) Hormones
 14) In honey bee, males are haploid and produce sperms by means of:
 (D.G. K. Board-New Scheme-Group-I-2014-
 A)
 a) Mitosis b) Meiosis
 c) Apomixis d) Parthenogenesis
 15) Discharge of egg from ovary is called:
 (D.G. K. Board-New Scheme-Group-II-2014-
 A)
 a) Ovulation b) Oogenesis
 c) Gametogenesis d) Menstrual cycle
 16) Germination of some seeds e.g. some lettuce varieties, is promoted by:
 (D.G.K. Board-New Scheme-Group-II-2014-
 A)
 a) Green light b) Blue light
 c) Red light d) Violet light
 17) Between the seminiferous tubules are interstitial cells which secrete:
 (D.G. K. Board-New Scheme-Group-I-2015-
 A)
 a) Spermatzoa b) Estrogen

- c) Testosterone d) Corpus luteum
 18) Fruit ripening is often accompanied by burst of respiratory activity called:
 (D.G. K. Board-New Scheme-Group-I-2015-

- A)
 a) Apomixis b) Climacteric
 c) Photoperiodism d) Endosperm
 19) Rapid aging and low resistance to environmental stress and diseases are limitations of:
 (D.G. K. Board-New Scheme-Group-II-2015-

- A)
 a) Parthenocarpary b) Vernalization
 c) Cloning d) Phototropism
 20) Evolution of pollen tube is parallel to the evolution of:
 (D.G. K. Board-New Scheme-Group-II-2015-

- A)
 a) Stem b) Leaves
 c) Flower d) Seed

SAHIWAL BOARD

- 1) Diploid parthenogenesis occurs in:
 (Sahiwal Board-2013-

- A)
 a) Wasp b) Bee
 c) Aphid d) Ant
 2) A spirochete, *Treponema pallidum* causes:
 (Sahiwal Board-2013-

- A)
 a) Genital Herpes b) Gonorrhea
 c) Syphilis d) AIDS
 3) Cause of Syphilis is:
 (Sahiwal Board-New Scheme-2014-

- A)
 a) *Neisseria* b) *Treponema*
 c) *Myobacterium* d) AIDS
 4) Labor pains are induced by:
 (Sahiwal Board-New Scheme-2014-

- A)
 a) Progesteron b) Oxytocin
 c) Corticosteroids d) Estrogen
 5) Discharge of egg from ovary is called:
 (Sahiwal Board-New Scheme-2015-

- A)
 a) Oogenesis b) Ovulation
 c) Gametogenesis d) Spermatogenesis
 6) Sperms are formed in:
 (Sahiwal Board-New Scheme-2015-

- A)
 a) Vas deferens b) Collecting ducts
 c) Epididymis d) Semineferous tubules

III) From Entry Test:-

- 1) Syphilis is caused by: (Entry Test-2007)
 a) *Neisseria gonorrhoeae* c) *Treponema pallidum*

- b) Catworm d) Herpes simplex
 2) It is known that red light ----- flowering in the long day plants: (Entry Test-2007)

- a) Synchronizes c) Promotes
 b) Inhibits d) Does not affect
 3) Syphilis is a sexually transmitted disease which is

- caused by: (Entry Test-2012)

- a) *Neisseria gonorrhoeae* c) *Treponema pallidum*
 b) *E. coli* d) *Myobacterium ovium*

- 4) Discharge of ovum or secondary oocyte from ovary or from Graffian follicle is called: (Entry Test-2012)

- a) Fertilization c) Follicle formation
 b) Pollination d) Ovulation

- 5) Secondary meiotic division in the secondary oocyte proceeds as for as: (Entry Test-2012)

- a) Metaphase c) Anaphase
 b) Prophase d) Telophase

- 6) Which of the followings differentiates directly into mature sperm? (Entry Test-2012)

- a) Primary spermatocyte c) Spermatogonia
 b) Secondary spermatocyte d) Spermatid

- 7) Uterus opens into the vagina through: (Entry Test-2012)

- a) Cervix c) External genitalia
 b) Fallopian tube d) Vulva

- 8) Which one of the following hormones is essential for successful production of sperms: (Self-Test Questions-2013)

- a) LH (luteinizing Hormone)
 b) Gonadotropin hormone
 c) Testosterone
 d) Follicle stimulating hormone

- 9) *Treponema pallidum* cause a disease (sexually transmitted) called: (Self-Test Questions-2013)

- a) Genital Herpes c) Gonorrhea
 b) AIDS d) Syphilis

- 10) The fertilization of ovum takes place in proximal part of the: (Self-Test Questions-2013)

- a) Uterus c) Placenta
 b) Oviduct d) Urethra

- 11) Pregnancy is maintained by the: (Self-Test Questions-2013)

- a) LTH (Luteotropic hormone) c) Corticosteroids
 b) Progesterone d) LH and FSH

- 12) At which month pregnancy the human embryo is referred to as the fetus: (Self-Test Questions-2013)

- a) 3rd month c) 6th month
 b) 4th month d) 2nd month

C h a p t e r ----

19

GROWTH AND DEVELOPMENT

1 MCQ

I) From Exercise:-

1) Growth rate is influenced by:
(Bahawalpur Board-2009-

A) (Gujranwala Board-2009-

- A) a) Hormones b) Water
c) Vitamins d) All a, b, c
- 2) Neurula is the stage in which embryo has:
a) Blastocoel b) Neural tube
c) The germ layers d) Archenteron
- 3) The mesodermal cells do not invaginate but migrate medially and caudally from both sides and create a midline thickening called:
a) Henson's node b) Primitive streak
c) Epiblast d) Hypoblast
- 4) The negative physiological changes in our body are called:
a) Degeneration b) Abnormalities
c) Aging d) Regeneration

II) From Punjab Boards:-

LAHORE BOARD

1. The meristem present at the base of internodes in many plants is: (Lahore Board-2008-

A) a) Apical meristem b) Intercalary meristem
c) Lateral meristem d) Cork cambium

2) Clear cytoplasm produces: (Lahore Board-2009-

A) a) Gut b) Neural tube
c) Muscle cells d) Larval epidermis

3) The larval epidermis is formed from: (Lahore Board-2010-

A) a) Clear cytoplasm b) Yellow cytoplasm
c) Gray vegetal cytoplasm
d) Gray equatorial cytoplasm

4) Cleavage results in the formation of a rounded closely packed mass of blastomeres called: (Lahore Board-2011-

A) a) Blastula b) Morulla
c) Gastrula d) Neurula

5) Somites are formed and organized by: (Lahore Board-Group-I-2012-

A) a) Ectoderm b) Mesoderm
c) Endoderm d) Blastoderm

6) Individuals with Klinefilter's syndrome have sex chromosomes as following:

(Lahore Board-Group-I-2012-

A) a) XO b) XXO
c) XXY d) XXXY

7) Cork cambium is the example of: (Lahore Board-Group-II-2012-

A) a) Lateral meristem b) Apical meristem
c) Intercalary meristem d) Bud primordia

8) At the cephalic end of primitive streak, closely packed cells from local thickening known as: (Lahore Board-Group-I-2013-

A) a) Primitive gut b) Primitive ridges
c) Hensen's node d) Splanchnic

mesoderm

9) Yellow cytoplasm of ascidian zygote gives rise to: (Lahore Board-Group-II-2013-

A) a) Muscle cells b) Gut
c) Neural tube d) Larval epidermis

10) Cleavage results in the formation of a rounded closely packed mass of blastomeres called: (Lahore Board-Old Scheme-Group-II-2014-

A) a) Morula b) Blastula
c) Gastrula d) Neurula

11) Optimum temperature for growth of plants is: (Lahore Board-New Scheme-Group-I-2014-

A) a) 30-40 °C b) 25-30 °C
c) 10-20 °C d) 20-40 °C

12) Which light enhances cell division and retard cell enlargement: (Lahore Board-New Scheme-Group-II-2014-

A) a) Red b) Green
c) Blue d) Violet

GUJRANWALA BOARD

1) The ability to regain the lost part, is called: (Gujranwala Board-2008-

A) a) Regeneration b) Aging
c) Embryonic induction d) None of these

2) Growth rate is influenced by: (Gujranwala Board-2009-

A) a) Hormones b) Water
c) Vitamins d) All of these

3) In plants elongation of cells is favored by: (Gujranwala Board-2010-

A) a) Infrared light b) Red light
c) Blue light d) Ultraviolet light

4) Cambium is an example of: (Gujranwala Board-2011-

A)

- a) Apical meristem b) Intercalary meristem
c) Lateral meristem d) Apex
5) Which light favors elongation of cells?
(Gujranwala Board-2012-

- A)
a) Blue b) Ultraviolet
c) Violet d) Red
6) Gray vegetal cytoplasm gives rise to:
(Gujranwala Board-2013-

- A)
a) Gut b) Muscle cells
c) Notochord d) Neural tube

- 7) *Acetabularia* is an/a:
(Gujranwala Board-New Scheme-2014-

- A)
a) Epiphyte b) Alga
c) Fungus d) Angiosperm
8) During elongation the cell volume increases upto:
(Gujranwala Board-New Scheme-2015-

- A)
a) 50 fold b) 100 fold
c) 150 fold d) 200 fold

MULTAN BOARD

- 1) The discoidal cap of cells above the blastocoele is called:
(Multan Board-2008-

- A)
a) Ectoderm b) Mesoderm
c) Blastoderm d) Endoderm

- 2) The branch of biology dealing with the study of abnormal development is known as:
(Multan Board-2008-

- S)
a) Physiology b) Gerontology
c) Embryology d) Teratology

- 3) In 18 hours chick embryos, which one is the most prominent structural feature:
(Multan Board-2009-

- A)
a) Neurocoel b) Primitive streak
c) Hensen's node d) Notochord

- 4) Which of following light favors elongation of Plant Cells?
(Multan Board-2009-

- S)
a) Blue b) Green
c) Red d) Orange

- 5) Cambium is formed in stage:
(Multan Board-2010-

- A)
a) One b) Two
c) Three d) Four

- 6) The light which favors elongation of cell is:
(Multan Board-2010-

- S)
a) White b) Red
c) Blue d) Ultraviolet

- 7) For the maximum growth of plants, the optimum temperature is:
(Multan Board-2011-

- A)
a) 15-20 °C b) 20-25 °C
c) 25-30 °C d) 30-35 °C

- 8) The negative physiological changes in our body are

called: (Multan Board-2011-

- S)
a) Regeneration b) Degeneration
c) Aging d) Abnormalities

- 9) Clear cytoplasm in an ascidian zygote produces:
(Multan Board-2012-

- A)
a) Muscle cells b) Larval epidermis
c) Gut d) Notochord

- 10) Which of the following pairs is correct:
(Multan Board (S)

- 2012)
a) Red light --- cell division
b) Ultraviolet light --- cell elongation
c) Blue light ---cell enlargement
d) Red light ----cell elongation

- 11) In microcephaly, the individuals are born with small:
(Multan Board-2013-

- A)
a) Eyes b) Hands
c) Legs d) Skull

- 12) For maximum growth in plants the optimum temperature is:

(Multan Board-Old Scheme-2014-

- A)
a) 0—35 °C b) 5—10 °C
c) 25—30 °C d) 35—40 °C

- 13) The negative physiological changes in our body are said to be:

(Multan Board-New Scheme-2014-

- A)
a) Maturation b) Childhood
c) Aging d) Death

- 14) The cavity formed between somatic and splanchnic mesoderm is: (Multan Board-New Scheme-2015-

- A)
a) Archenteron b) Hensen's node
c) Coelom d) Neurocoel

BAHAWALPUR BOARD

- 1) A little distance from apex of root and shoot lies the zone of: (Bahawalpur Board-2008-

- A)
a) Division b) Differentiation
c) Maturation d) Elongaion

- 2) Growth rate is influenced by:
(Bahawalpur Board-2009-

- A)
a) Hormones b) Water
c) Vitamins c) All a, b, c

- 3) Blue light enhances:
(Bahawalpur Board-2009-

- S)
a) Cell division b) Cell elongation
c) Both a and b d) None of these

- 4) Hatching period of chick is:
(Bahawalpur Board-2010-

- A)
a) 15 days b) 18 days
c) 21 days d) 28 days

- 5) During elongation the cell volume increases up to 150 times due to uptake of:

(Bahawalpur Board-2010-

- S)
 a) Minerals b) **Water**
 c) Air d) Food
 6) **How many fold, cell volume increases during elongation due to uptake of water:**
 (Bahawalpur Board-2011-

- A)
 a) 120 b) 130
 c) **150** d) 180

- 7) **The optimum temperature for maximum growth plants is:**
 (Bahawalpur Board-2012-

- A)
 a) 20—25 °C b) **25—30 °C**
 c) 30—35 °C d) 35—40 °C

- 8) **In Plants which light enhances cell division:**
 (Bahawalpur Board-2013-

- A)
 a) Infra Red b) **Blue**
 c) Red d) Ultraviolet

- 9) **For maximum growth, Optimum temperature is:**
 (Bahawalpur Board-New Scheme-2014-

- A)
 a) 0-35 °C b) 5-10 °C
 c) **25-30 °C** d) 35-40 °C

- 10) **Intercalary meristems are situated at:**
 (Bahawalpur Board-New Scheme-2015-

- A)
 a) Root Apex b) Shoot Apex
 c) **Base of Internode** d) Top of Internode

FAISALABAD BOARD

- 1) **The light which favors elongation of cells is:**
 (Faisalabad Board-2008-

- A)
 a) White b) Ultraviolet
 c) Red d) **Blue**

- 2) **Early development of chick is similar to:**
 (Faisalabad Board-2009-

- A)
 a) Fish b) Amphibians
 c) Reptilia d) Mammalia

- 3) **Young tissues retaining the potential to divide:**
 (Faisalabad Board-2010-

- A)
 a) **Meristem** b) Xylem
 c) Phloem d) Cork

- 4) **The light which favors the elongation of plant cells:**
 (Faisalabad Board-2011-

- A)
 a) **Red** b) Infra-red
 c) Blue d) Violet

- 5) **The growing tip of young stem moves in zig-zag fashion of the apex are:** (Faisalabad Board-2012-

- A)
 a) Hyponasty b) Epinasty
 c) **Nutation** d) Haptonasty

- 6) **Blastomere are formed during:** ▲
 (Faisalabad Board-2013-

- A)
 a) **Cleavage** b) Gastrulation
 c) Growth d) Fertilization

- 7) **The chick embryo completes its development in:**

(Faisalabad Board-Old Scheme-2014-

- A)
 a) 26 days b) 24 days
 c) **21 days** d) 20 days

- 8) **During gastrulation the blastoderm splits into two layers, an upper layer of cells is called:**
 (Faisalabad Board-New Scheme-2014-

- A)
 a) Hypoblast b) Area pellucida
 c) Epiblast d) **Epiblast**

- 9) **For maximum growth, optimum temperature is:**
 (Faisalabad Board-New Scheme-2015-

- A)
 a) 5-10 °C b) 0-35 °C
 b) **25-30 °C** d) 40-50 °C

RAWALPINDI BOARD

- 1) **The negative physiological changes in our body are called:**
 (Rawalpindi Board-2010-

- A)
 a) Teratology b) **Aging**
 c) Degeneration d) Abnormalities

- 2) **Which type of light favours elongation of cells in plants:**
 (Rawalpindi Board-2011-

- A)
 a) **Red light** b) Blue light
 c) Infrared d) Ultraviolet

- 3) **Temperature influences rate of growth within a range from:**
 (Rawalpindi Board-2012-

- A)
 a) 5—10 °C b) **25—30 °C**
 c) 0—35 °C d) 35—40 °C

- 4) **The hypoblast is mainly presumptive:**
 (Rawalpindi Board-2013-

- A)
 a) **Endoderm** b) Mesoderm
 c) Ectoderm d) Blastoderm

- 5) **In which development stage, germ layers are formed:** (Rawalpindi Board-New Pattern-2015-

- A)
 a) Morula b) Blastulation
 c) **Gastrulation** d) Neurulation

SARGODHA BOARD

- 1) **Neural plate is formed from ----- :**
 (Srgodha Board-2010-

- A)
 a) **Ectoderm** b) Mesoderm
 c) Endoderm d) Notochord

- 2) **Clear cytoplasm of fertilized egg of an ascidian produces:**
 (Srgodha Board-2011-

- A)
 a) **Larval epidermis** b) Muscle cells
 c) Gut d) Neural tube

- 3) **The light that enhances cell division but retard cell enlargement is:**
 (Sargodha Board-2012-

- A)
 a) **Blue light** b) Green light
 c) Green light d) Yellow light

- 4) **Cleavage is results in a structure called:**
 (Sargodha Board-2013-

- A)

- a) Blastula b) Blastoderm
c) Morula d) Gastrula

DERA GHAZI KHAN BOARD

- 1) The progressive changes which are undergone before an organism acquires its adult's form constitute: (Dera Ghazi Khan Board-2009-

- A) a) Growth b) Metamorphosis
c) Development d) Embryonic

development

- 2) Gray vegetal cytoplasm gives rise to: (Dera Ghazi Khan Board-2010-

- A) a) Neural tube b) Gut
c) Muscle cells d) Larval epidermis

- 3) The branch of Biology which deals with the study of abnormal development and their causes is called: (Dera Ghazi Khan Board-2011-

- A) a) Teratology b) Gerontology
c) Embryology d) Microcephaly

- 4) Apical meristems are present in: (D.G.K Board-Group-I-2012-

- A) a) Shoot and root tips b) Vascular cambium
c) Cork cambium d) Stem nodes

- 5) Light enhances cell division in plants: (D.G.K Board-Group-II-2012-

- A) a) Yellow b) Green
c) Red d) Blue

- 6) Which one is responsible for apical dominance: (D.G.K Board-Group-I-2013-

- A) a) Water b) Auxins
c) Ethene d) Light

- 7) The germ layers are formed during: (D.G.K Board-Group-I-

- 2013) a) Cleavage b) Gastrulation
c) Organogenesis d) Growth

- 8) In the zone of elongation, the volume of the cells increases up to:

- (D.G.K Board-New Scheme-Group-I-2014-

- A) a) 100 times b) 150 times
c) 200 times d) 250 times

- 9) Gray vegetal cytoplasm gives rise to: (D.G.K Board-New Scheme-Group-II-2014-

- A) a) Gut b) Muscle cells
c) Larval epidermis d) Notochord

- 10) Which of the following sex chromosome abnormalities leads to tallness, aggressiveness and antisocial behavior?

- (D.G.K Board-New Scheme-Group-I-2015-

A)

- a) **XXY** b) **XXY**
c) **XO** d) **XXXY**

- 11) The shell of chick egg is secreted as egg passes through:

(D.G.K Board-New Scheme-Group-II-2015-

- A) a) Oviduct b) Uterus
c) Ovary d) Fallopian tube

SAHIWAL BOARD

- 1) The abnormality in which individuals have their upper lip folded or the individual has harelip is:

(Sahiwal Board-2013-

- A) a) Microcephaly b) Cleft palate
c) Klinefilter syndrome d) Brachydectyly

- 2) The study of aging is called: (Sahiwal Board-New Scheme-2015-

- A) a) Teratology b) Gerontology
c) Physiology d) Cytology

III) From Entry Test:-

- 1) Name the internal factor of growth in plants: (Entry Test-

2007)

- a) Carbon dioxide c) **Hormones**
b) Water d) Nutrition

C h a p t e r ----
20

CHROMOSMES AND DNA

1 MCQ

I) From Exercise:-

- 1) m RNA is synthesized by:

- a) DNA polymerase b) **RNA Polymerase**
c) RNA ligase d) None of the above

- 2) Which of the following are non-sense codons?

- a) AUG b) **UAA**
c) CUA d) All of above

- 3) Enzymes are responsible for assembly of:

- a) Nucleic acid b) Protein
c) Carbohydrates d) **All a, b, c**

- 4) In bacteria the newly synthesized m RNA m RNA

is released in:

- a) Nucleus b) **Cytoplasm**
c) Mitochondria d) Both a and c

II) From Punjab Boards:-**LAHORE BOARD**

- 1) A central role for chromosomes in heredity was first suggested in 1900 by: (Lahore Board-2008-

- A) a) W. S. Sutton. b) T. H. Morgan
c) **Karl Correns** d) Walther Fleming

- 2) Successive amino acids bearing tRNA will bind at:

- (Lahore Board-2009-
A) a) A site b) B site
c) E site d) P site
3) Human cells contain 45 different kinds of:
(Lahore Board-2009-
A) a) DNA b) mRNA
c) tRNA d) tRNA
4) Which of the following is a Stop Signal during the transcription:
(Lahore Board-2010-
A) a) CA b) GA
c) GC d) TA
5) In 1882 chromosomes were first observed by:
(Lahore Board-2011-
A) a) John Brown b) T. H. Morgan
c) Walther Fleming d) Walter Sutton
6) A gene with initiation codon, which encodes the amino acid methionine:
(Lahore Board-Group-I-2012-
A) a) UAA b) UAG
c) AUG d) UGG
7) Supporting role in DNA replication is played by an enzyme called: (Lahore Board-Group-II-2012-
A) a) RNA polymerase
b) Aminoacyl-tRNA synthetase
c) DNA polymerase III
d) DNA polymerase I
8) After every 200 nucleotide, the DNA duplex is coiled around a core of eight histone proteins forming a complex known as:
(Lahore Board-Group-I-2013-
A) a) Polysome b) Nucleosome
c) Heterochromatin d) Euchromatin
9) Amino acid attachment site at tRNA is:
(Lahore Board-Group-II-2013-
A) a) G end b) 2' end
c) 3' end d) 5' end
10) The number of chromosomes in corn is:
(Lahore Board-Old Scheme-Group-II-2014-
A) a) 40 b) 26
c) 20 d) 80
11) Morphological characteristics of chromosomes are collectively called:
(Lahore Board-New Scheme-Group-II-2014-
A) a) Holotype b) Karyokinesis
c) Karyotype d) Neotype
12) Number of chromosome present in honey bee are:
(Lahore Board-New Scheme-Group-II-2014-
A) a) 6 b) 20

- c) 32 d) 40

GUJRANWALA BOARD

- 1) Human cells have chromosome pairs:
(Gujranwala Board-2008-
A) a) 46 b) 23
c) 20 d) 10
2) A typical human chromosome contains about ---- million nucleotides in its DNA:
(Gujranwala Board-2009-
A) a) 100 b) 120
c) 140 d) 160
3) mRNA is synthesized by:
(Gujranwala Board-2009-
A) a) DNA polymerase b) RNA polymerase
c) DNA ligase d) None of these
4) Phenylketonuria is a well-known example of:
(Gujranwala Board-2010-
A) a) Deletion b) Insertion
c) Inversions d) Point mutation
5) V-shaped chromosomes are called:
(Gujranwala Board-2011-
A) a) Acrocentric b) Telocentric
c) Metacentric d) Sub-metacentric
6) Every 200 nucleotides, the DNA duplex is coiled around a core of eight histone proteins forming a complex known as: (Gujranwala Board-2012-
A) a) Polysome b) Heterochromatin
c) Nucleosome d) Euchromatin
7) Every gene starts with initiation codon AUG which normally encodes the amino acid:
(Gujranwala Board-2013-
A) a) Arginine b) Citrulline
c) Lysine d) Methionine
8) Repeating units of DNA are called:
(Gujranwala Board-New Scheme-2014-
A) a) Histones b) Nucleosides
c) Nucleotides d) Amino acids
9) Unlike most proteins, histones are ----- :
(Gujranwala Board-New Scheme-2015-
A) a) Positively charged b) Negatively charged
c) Neutral d) Discharged
MULTAN BOARD
1) The binding of RNA polymerase to promoter is the first step in gene:
(Multan Board-2008-
A) a) Transcription b) Translation
c) Transduction d) All of these

2) Complete sequence of amino acids in insulin was worked out by: (Multan Board-2008-S)

- a) Frederick Sanger b) Garrod and William
c) Beadle and Tatum d) Vernom Ingram

3) The replication of DNA is always from: (Multan Board-2009-A)

- a) 5'—3' b) 3'—5'
c) Both d) None

4) The chromosomes acquire different shapes during cell division at the time of: (Multan Board-2009-S)

- a) Metaphase b) Prophase
c) Anaphase d) Telophase

5) The number of chromosomes in Mouse are: (Multan Board-2009-S)

- a) 40 b) 26
c) 32 d) 06

6) Histones are positively charged proteins due to having abundance of the basic amino acids arginine and: (Multan Board-2010-A)

- a) Leucine b) Lysine
c) Valine d) Glycine

7) Chromosomes consist of DNA and Protein in the ratio: (Multan Board-2010-S)

- a) 70 %--30 % b) 90 %--10 %
c) 20 %-- 80 % d) 40 %-- 60 %

8) The Chromosomes first time observed by the German Embryologist Walther Fleming in: (Multan Board-2011-A)

- a) 1880 b) 1882
c) 1884 d) 1886

9) Walther Fleming first observed chromosomes in the dividing cells of: (Multan Board-2011-S)

- a) Frog Larvae b) Salamander

Larvae
c) Sea Urchin Larvae d) Insect Larvae

10) The central role for chromosomes in heredity was first suggested by: (Multan Board-2012-A)

- a) Karl Correns b) Karl Landsteiner
c) Walter Sutton d) Walther Fleming

11) RNA polymerase I is used for the synthesis of: (Multan Board-2012-S)

- a) mRNA b) tRNA
c) rRNA d) DNA

12) Beadle and Tatum exposed Neurospora spores to: (Multan Board-2013-A)

- a) X-rays b) Alpha rays
c) Gamma rays d) Beta rays

13) The chromosome having centromere in the centre

are called: (Multan Board-Old Scheme-2014-A)

- a) Telocentric b) Acrocentric
c) Submetacentric d) Metacentric

14) Highly condensed portions of chromatin are called:

(Multan Board-New Scheme-2014-A)

- a) Homochromatin b) Euchromatin
c) Heterochromatin d) Achromatin

15) The particular array of chromosomes that an individual possesses is called:

(Multan Board-New Scheme-2015-A)

- a) Genotype b) Phenotype
c) Wild type d) Karyotype

BAHAWALPUR BOARD

1) First step in gene transcription is binding RNA polymerase to: (Bahawalpur Board-2008-A)

- a) Motor b) Promotor
c) ∞ d) β

2) Fredrick Sanger described complete sequence of Amino Acids of: (Bahawalpur Board-2008-A)

- a) Biotin b) Isoline
c) Insulin d) Glutamic acid

3) Erwin Chargoff showed that amount of adenine in

DNA is always equal to:

(Bahawalpur Board-2008-A)

- a) Cytosine b) Guanine
c) Thymine d) Uracil

4) Typically a chromosome is made of: (Bahawalpur Board-2009-A)

- a) Chromatids b) Centromere
c) Secondary constriction d) All a, b, c

5) During translation empty tRNA will exit the ribosome at: (Bahawalpur Board-2009-S)

- a) P-site b) A-site
c) D-site d) E-site

6) In transcription the simplest stop signal is a series

of: (Bahawalpur Board-2009-S)

- a) GC base pairs b) AT base pairs
c) AC base pairs d) GT base pairs

7) Synthesis of Protein in Cytoplasm is called:

(Bahawalpur Board-2010-A)

- a) Transcription b) Translation
c) Replication d) Transformation

8) Human Chromosomes contain about 140 million nucleotides in its: (Bahawalpur Board-2010-A)

- a) mRNA b) tRNA
c) rRNA d) DNA

9) In 1869, DNA was first discovered by:

(Bahawalpur Board-2010-S)

- a) F. Meischer b) P. A. Leavne
c) Watson & Crick d) Franklind
- 10) How many million nucleotides are in DNA of typical human chromosome:
(Bahawalpur Board-2011-)
- A)
a) 140 b) 160
c) 180 d) 200
- 12) The total chromosomal complement of a cell is called:
(Bahawalpur Board-2012-)
- A)
a) Phenotype b) Genotype
c) Epistasis d) Metastasis
- 13) The central role for Chromosome in heredity was first suggested by:
(Bahawalpur Board-2013-)
- A)
a) Fred Griffith b) F. Sanger
c) Karl Correns d) Fred Meischer
- 14) Which strand of DNA is transcribed:
(Bahawalpur Board-New Scheme-2014-)
- A)
a) Coding b) Sense
c) Template d) Both Strands
- 15) One of the given does not code for any amino acid:
(Bahawalpur Board-New Scheme-2015-)
- A)
a) AUG b) ACU
c) GUA d) UAA

FAISALABAD BOARD

- 1) Most of chromosomes consist of DNA and protein:
(Faisalabad Board-2008-)
- A)
a) 90 %-- 10 % b) 20 % --80 %
c) 40 %--60 % d) 73 % -- 30 %
- 2) Genetic is code combination ----- nucleotides:
(Faisalabad Board-2009-)
- A)
a) 2 b) 4
c) 5 d) 3
- 3) Which is not stop signal?
(Faisalabad Board-2009-)
- A)
a) UAA b) UUU
c) UAG d) UGA
- 4) X-ray diffraction pattern of DNA was prepared by:
(Faisalabad Board-2010-)
- A)
a) Watson and Crick b) Beadle and Tatum
c) Chargaff and Walkins
d) Frankine and Walkins
- 5) The basic structure of nucleic acids was determined by:
(Faisalabad Board-2011-)
- A)
a) Watson and Crick b) Maurice Walkins
c) P.A. Levene d) Vernon Ingram
- 6) The 5-carbon sugar in DNA is:
(Faisalabad Board-2012-)
- A)
a) Maltose b) Ribose

- c) Deoxyribose d) Lactose
- 7) In eukaryotes, the number of nucleotides in Okazaki fragments are about:
(Faisalabad Board-2013-)
- A)
a) 1000—2000 b) 100—200
c) 300—400 d) 400—500
- 8) V-shaped chromosomes are called:
(Faisalabad Board-Old Scheme-2014-)
- A)
a) Metacentric b) Sub-metacentric
c) Telocentric d) Acrocentric
- 9) The number of chromosomes in mouse is:
(Faisalabad Board-New Scheme-2014-)
- A)
a) 06 b) 32
c) 26 d) 40
- 10) Transfer of genetic material from one cell to another, which alter the genetic make up of recipient cell is called:
(Faisalabad Board-New Scheme-2015-)
- A)
a) Transformation b) Translation
c) Transcription d) Transduction

RAWALPINDI BOARD

1. Penicillium, a fungus has the following pairs of chromosomes:
(Rawalpindi Board-2010-)
- A)
a) One pair b) Two pairs
c) Three pairs d) Four pairs
- 2) The 5-Carbon sugar in DNA is:
(Rawalpindi Board-2011-)
- A)
a) Ribose b) Maltose
c) Fructose d) Deoxy-ribose
- 3) The gene causing white eye trait in Drosophila resides only on the:
(Rawalpindi Board-2012-)
- A)
a) Autosome 3 b) Autosome 7
c) Y Chromosome d) X Chromosome
- 4) The number of chromosomes in frog is:
(Rawalpindi Board-2013-)
- A)
a) 6 b) 26
c) 40 d) 46
- 5) Human cell contains types tRNA molecules:
(Rawalpindi Board –New Pattern-2014-)
- A)
a) 20 b) 45
c) 95 d) 300
- 6) The sequence of nucleotides that determines the amino acid sequence of a protein is called:
(Rawalpindi Board-New Pattern-2015-)
- A)
a) Allele b) Multiple alleles
c) Chromosome d) Gene

SARGODHA BOARD

- 1) How many different kinds of transfer RNAs are in Human cell?
(Sargodha Board-2010-)
- A)
a) 20 b) 25
c) 45 d) 54

2) Copying of mRNA from DNA is called:
(Sargodha Board-2011-

- A)
a) Translation b) Transduction
c) Transformation d) Transcription

3) In sickle anemia, a point mutation leads to the change of amino acid, i.e. glutamic acid into:
(Sargodha Board-2012-

- A)
a) Arginine b) Lysine
c) Valine d) Alanine

4) The stop signal GC series of a base pairs is the part of:
(Sargodha Board-2013-

- A)
a) DNA b) mRNA
c) tRNA d) rRNA

DERA GHAZI KHAN BOARD

1) The bond, that exists between N₂ bases of DNA, is:

(Dera Ghazi Khan Board-2009-

- A)
a) Covalent b) Ionic
c) Hydrogen d) Phosphodiester

2) Sickle cell anemia is caused due to change of glutamic acid to:
(Dera Ghazi Khan Board-2010-

- A)
a) Histidine b) Leucine
c) Valine d) Proline

3) Chromosomal theory of inheritance was formulated by: (Dera Ghazi Khan Board-2011-

- A)
a) Karl Correns b) T. H. Morgan
c) Calvin bridges d) W. Sutton

4) Okazaki fragments are synthesized by:
(D.G.K Board-Group-I-2012-

- A)
a) DNA ligase b) RNA polymerase
c) DNA polymerase d) Helicase

5) Number of chromosomes in *Penicillium* fungus, are:
(D.G.K Board-Group-II-2012-

- A)
a) 1 b) 2
c) 6 d) 32

6) Basic structure of nucleic acids, was determined by:
(D.G.K Board-Group-I-2013-

- A)
a) P. A. Levene b) Watson and Crick
c) Walkins d) Ingram

7) Highly Condensed portions of the chromatin are called:
(D.G.K Board-Group-II-2013-

- A)
a) Nucleosome b) Heterochromatin
c) Euchromatin d) Polysome

8) Walther Fleming discovered Chromosomes in the dividing cells of:

(D.G.K Board-Group-I-2014-

- A)
a) Frog larvae b) Sea urchin larvae
c) Insect larvae d) Salamander larvae

9) The particular array of chromosomes that an individual possess is called its:
(D.G.K. Board-New Scheme-Group-II-2014-

- A)
a) Genotype b) Phenotype
c) Karyotype d) Epistasis

10) The particular array of chromosomes that an individual possesses is called its:
(D.G.K. Board-New Scheme-Group-I-2015-

- A)
a) Genome b) Karyotype
c) Gene pool d) DNA-duplex

11) RNA polymerase II synthesizes:
(D.G.K. Board-New Scheme-Group-II-2015-

- A)
a) mRNA b) tRNA
c) rRNA d) cDNA

SAHIWAL BOARD

1) Each Okazaki fragment is synthesized by:
(Sahiwal Board-2013-

- A)
a) RNA polymerase b) DNA polymerase I
c) DNA polymerase II d) DNA polymerase III

2) Nucleosomes occur every:
(Sahiwal Board-New Scheme-2014-

- A)
a) 50 nucleotides b) 100 nucleotides
c) 150 nucleotides d) 200 nucleotides

3) Which of the following is non-sense codon?
(Sahiwal Board-New Scheme-2015-

- A)
a) UGA b) UGG
c) AUG d) AUC

III) From Entry Test:-

1) In what direction can a DNA polymerase work when catalyzing the addition of nucleotide monomers to build a strand of DNA?

(Entry Test-

2007)

- a) From the 5' toward the 3' end of the new strand

being assembled

- b) From the 3' to 5' end of the strand being assembled
c) From replication centres in two directions called replication forks
d) In both directions if DNA ligase is present

2) Which of the following has 40 chromosomes?

(Entry Test-

2007)

- a) Corn c) Frog
b) Sugarcane d) Mouse

3) The two strands in DNA are coiled ----- to each

other:

(Entry Test-

2007)

- a) Parallel c) Both a, b
b) Antiparalle d) None of these

C h a p t e r ----

21

CELL CYCLE

2 MCQs

I) From Exercise:-

- 1) In Klinefelter's syndrome:
 - a) One X is missing
 - b) Additional sex chromosome is present
 - c) Sex chromosomes fail to segregate
 - d) None of these
- 2) Mitosis is divided into:
 - a) Karyokinesis
 - b) Cytokinesis
 - c) Interphase
 - d) Both a and b
- 3) Separation of homologous chromosomes occurs during:
 - a) Prophase
 - b) Metaphase
 - c) Telophase
 - d) Anaphase

II) From Punjab Boards:-**LAHORE BOARD**

- 1) In which phase of cell cycle, the number of chromosomes become double:

(Lahore Board-2008-

A)

 - a) S phase
 - b) G₁ phase
 - c) G₂ phase
 - d) G₀ phase
- 2) The most critical phase of mitosis is:

(Lahore Board-2009-

A)

 - a) Prophase
 - b) Metaphase
 - c) Anaphase
 - d) Telophase
- 3) Which one is absent in animal cell:

(Lahore Board-2010-

A)

 - a) Spindle
 - b) Centriole
 - c) Chromatids
 - d) Phragmoplast
- 4) The condensation of chromosomes reaches to its maximum at:

(Lahore Board-2011-

A)

 - a) Leptotene
 - b) Zygotene
 - c) Pachytene
 - d) Diakinesis
- 5) Individuals with Klinefelter's syndrome have sex chromosome as following:

(Lahore Board-Group-I-2012-

A)

 - a) XO
 - b) XXO
 - c) XXY
 - d) XXXY
- 6) Synapsis starts during:

(Lahore Board-Group-II-2012-

A)

 - a) Leptotene
 - b) Zygotene
 - c) Pachytene
 - d) Diplotene
- 7) The vesicle forming phragmoplast originate during:

(Lahore Board-Group-I-2013-

A)

 - a) Prophase
 - b) Interphase
 - c) Metaphase
 - d) Telophase
- 8) The syndrome having trisomy of chromosome

number 18 is: (Lahore Board-Group-II-2013-

- A)
- a) Down's
 - b) Patau's
 - c) Edward's
 - d) Jacob's
- 9) Cancer is mainly caused by mutations in:

(Lahore Board-Old Scheme-Group-II-2014-

A)

 - a) Sex cells
 - b) Somatic cells
 - c) Both a and b
 - d) None of these
 - 10) Synapsis occurs during:

(Lahore Board-New Scheme-Group-I-2014-

A)

 - a) Pachytene
 - b) Leptotene
 - c) Zygotene
 - d) Diplotene
 - 11) Apoptosis is:

(Lahore Board-New Scheme-Group-I-2014-

A)

 - a) Division of cells
 - b) Death of cells by tissue damage
 - c) Suicide of cells
 - d) Weakness of cells
 - 12) The spread of tumor cells and establishment of secondary area of growth is known as:

(Lahore Board-New Scheme-Group-II-2014-

A)

 - a) Necrosis
 - b) Apoptosis
 - c) Metastasis
 - d) Epigenesis
 - 13) Microtubules are composed of protein tubulin and traces of:

(Lahore Board-New Scheme-Group-II-2014-

A)

 - a) RNA
 - b) DNA
 - c) Glycolipid
 - d) Phospholipid

GUJRANWALA BOARD

- 1) Exchange of chromosome segments due to chiasmata formation is called:

(Gujranwala Board-2008-

A)

 - a) Crossing over
 - b) Linkage
 - c) Diplotene
 - d) None of these
- 2) The spread of tumor cells to secondary areas of growth is called:

(Gujranwala Board-2009-

A)

 - a) Epiastasis
 - b) Peristalsis
 - c) Metastasis
 - d) None of these
- 3) The syndrome having trisomy of chromosome number 18 is:

(Gujranwala Board-2010-

A)

 - a) Down's
 - b) Patau's
 - c) Edward's
 - d) Jacob's
- 4) Th spindle fibers are composed of RNA and protein called:

(Gujranwala Board-2011-

A)

 - a) Insulin
 - b) Tubulin
 - c) Actin
 - c) Myosin
- 5) The autosomal non-disjunction in man in which

21st pair of chromosome fails to segregate, resulting in gamete with 24 chromosomes is called:
(Gujranwala Board-2012-

- A) a) Down's syndrome b) Turner's syndrome
c) Klinefelter's syndrome d) Jacob's syndrome

6) In the case of human cell, cell cycle duration is about:
(Gujranwala Board-2013-

- A) a) 24 hours b) 23 hours
c) 22 hours d) 21 hours

6) Chromatin network is visible during:
(Gujranwala Board-New Scheme-2014-

- A) a) Interphase b) Prophase
d) Metaphase d) Anaphase

7) Microtubules are composed of:
(Gujranwala Board-(New Scheme-2014-

- A) a) Tubulin b) Insulin
c) Hemoglobin d) Adrenaline

8) The microtubules are composed of a protein and traces of:
(Gujranwala Board-New Scheme-2015-

- A) a) DNA b) RNA
c) Lipids d) Terpenoids

9) Tissue culture and cloning seek help through:
(Gujranwala Board-New Scheme-2015-

- A) a) Mitosis b) Endomitosis
c) Meiosis d) Karyokinesis

MULTAN BOARD

1) The paired chromosomes repel:
(Multan Board-2008-

- A) a) Diplotene b) Zygotene
c) Diakinesis d) Pachytene

2) Nuclear reorganization occurs during:
(Multan Board-2008-

- S) a) Telophase b) Anaphase
c) Metaphase d) Prophase

3) In human cell, average cell cycle is about:
(Multan Board-2009-

- A) a) 8 hours b) 12 hours
c) 18 hours d) 24 hours

4) Which of the following stage of Prophase I lasts for days, weeks or even years: (Multan Board-2009-

- S) a) Leptotene b) Pachytene
c) Diplotene d) Zygotene

5) The chromatin material gets condensed by folding and the chromosome appears as thin thread in Mitosis at the beginning of: (Multan Board-2010-

- A) a) Interphase b) Prophase
c) Metaphase d) Telophase

6) The proteins which become activated during

cytokinesis are: (Multan Board-2010-

- S) a) Globulin b) Hemoglobin
c) Actin and myosin d) Fibrin

7) The chromosome number become doubled during:

(Multan Board-2011-

- A) a) G₁-phase b) G₂-phase
c) S-phase d) G₀-phase

8) The stage of mitosis at which chromatids separate as independent structures (chromosomes) is the:
(Multan Board-2011-

- S) a) Prophase b) Telophase
c) Metaphase d) Anaphase

9) The individuals have additional sex chromosome in:
(Multan Board-2012-

- A) a) Turner's Syndrome b) Down's Syndrome
c) Edward's Syndrome d) Klinefelter's

Syndrome
10) Least number of chiasmata are present during:
(Multan Board-2012-

- S) a) Leptotene b) Diakinesis
c) Pachytene d) Diplotene

11) The spread of tumor cells and establishment of secondary areas of growth: (Multan Board-2013-

- A) a) Epistasis b) Pabstasis
c) Pleiotropy d) Metastasis

12) The stage of meiosis that lasts for days, weeks or even years is: (Multan Board-Old Scheme-2014-

- A) a) Leptotene b) Zygotene
c) Pachytene d) Leptotene

13) An unwanted clone of cells and establishment of secondary areas of growth is called:
(Multan Board-New Scheme-2014-

- A) a) Tumor b) Growth
c) Lump d) Swelling

14) In Non-Disjunction, chromosomes fail to segregate during: (Multan Board-New Scheme-2014-

- A) a) Prophase b) Metaphase
c) Anaphase d) Telophase

15) Cancer is caused mainly by mutation in:
(Multan Board-New Scheme-2015-

- A) a) Somatic cells b) Malignant cells
c) Sex cells d) Reproductive cells

16) During cell division, the nuclear division is called:
(Multan Board-New Scheme-2015-

- A) a) Cytokinesis b) Karyokinesis
c) Karyotype d) Plasmolysis

BAHAWALPUR BOARD

1) Most higher plants lack visible:

(Bahawalpur Board-2008-

- A) a) Nucleus b) Mitochondria
c) Plastids d) Centrioles.

2) In Klinefelter's syndrome:

(Bahawalpur Board-2009-

- A) a) One X-Chromosome is missing
b) Additional sex chromosome is present
c) Sex chromosomes fail to segregate
d) None of these

3) The stage that lasts for days, weeks or even years is:

(Bahawalpur Board-2009-

- S) a) Leptotene b) Zygotene
c) Pachytene d) Diplotene
- 4) Healing of wound and repair of tissues depend on:

(Bahawalpur Board-2010-

- A) a) Mitosis b) Meiosis
c) Amitosis d) Mutation
- 5) Condensation of chromosome reaches to its maximum during: (Bahawalpur Board-2010-

- S) a) Leptotene b) Diplotene
c) Zygotene d) Diakinesis
- 6) The spread of Tumor Cells and establishment of secondary areas of growth is called:

(Bahawalpur Board-2011-

- A) a) Necrosis b) Metastasis
b) Apoptosis d) Epigenesis
- 7) The Spindle Fibers are composed of RNA and a Protein: (Bahawalpur Board-2012-

- A) a) Actin b) Myosin
c) Tubulin d) Insuline
- 8) Pairing of Homologous Chromosomes start in: (Bahawalpur Board-2013-

- A) a) Leptotene b) Zygotene
c) Pachytene d) Diplotene
- 9) Programmed and Organized death of cell is also known as:

(Bahawalpur Board-New Scheme-2014-

- A) a) Necrosis b) Apoptosis
c) Cyclosis d) Chlorosis

10) The actual cell division is:

(Bahawalpur Board-New Scheme-2014-

- A) a) Meiosis I b) Meiosis II
c) Mitosis d) Cytokinesis

11) Post Mitotic Cell can exit the Cell Cycle during: (Bahawalpur Board-New Scheme-2015-

- A) a) G₀ - phase b) G₁ - phase
c) S - phase d) G₂ - phase
- 12) Karyokinesis involves division of Nucleus and Cytokinesis refers to:

(Bahawalpur Board-New Scheme-2015-

- A) a) Division of Whole Cell
b) Division of Cytoplasm
c) Division of Centromere
d) Division of Cell Wall

FAISALABAD BOARD

1) The proteins which become active during cytokinesis are: (Faisalabad Board-2008-

- A) a) Hemoglobin b) Fibrin
c) Actin and myosin d) Globulin

2) Cancer is mainly caused by mutation in:

(Faisalabad Board-2009-

- A) a) Somatic cell b) Germ cell
c) Gland cell d) Plasma cell

3) The most critical phase of mitosis:

(Faisalabad Board-2010-

- A) a) Prophase b) Metaphase
c) Anaphase d) Telophase

4) The syndrome having trisomy at chromosome pair

number 21 is: (Faisalabad Board-2011-

- A) a) Turner's b) Down's
c) Patau's d) Edward's

5) The centrioles lie within the:

(Faisalabad Board-2012-

- A) a) Karyosome b) Centrosome
c) Chromosome d) Nucleosome

6) Meiosis generally takes place in plants during formation of: (Faisalabad Board-2013-

- A) a) Gametes b) Spores
c) Zygote d) Embryo

7) Spindle fibers are composed of RNA and protein called: (Faisalabad Board-Old Scheme-2014-

- A) a) Insulin b) Myosin
c) Tubulin d) Actin

8) The stage of mitosis at which chromatids separate:

(Faisalabad Board-Old Scheme-2014-

- A) a) Prophase b) Metaphase
c) Anaphase d) Telophase

8) The most critical phase of mitosis, which ensures equal distribution of chromatids in the daughter cells is: (Faisalabad Board-New Scheme-2014-

- A) a) Anaphase b) Metaphase
c) Prophase d) Telophase

9) All are related to Turner's Syndrome, except: (Faisalabad Board-New Scheme-2014-

- A) a) Short stature b) Webbed neck
c) Broad face d) Without ovaries

10) Programmed and organized process of cell division is also called:

(Faisalabad Board-New Scheme-2015-

- A)
 a) Apoptosis b) Necrosis
 c) Cancer d) Metastasis

11) Type of cell division in which number of chromosome is reduced to half in daughter cells is

called: (Faisalabad Board-New Scheme-2015-

- A)
 a) Mitosis b) Meiosis
 c) Budding d) Binary fission

RAWALPINDI BOARD

1) In Klinefelters syndrome:

(Rawalpindi Board-2010-

- A)
 a) One X-Chromosome is missing
 b) Additional sex chromosome present
 c) Sex chromosomes fail to segregate
 d) None of these

2) Each bivalent is consisted of four:

(Rawalpindi Board-2011-

- A)
 a) Chromosomes b) Chromatids
 c) Chismata d) Spores

3) The stage for days, weeks, or years is:

(Rawalpindi Board-2012-

- A)
 a) Leptotene b) Zygotene
 c) Pachytene d) Diplotene

4) The pairing of of homologous chromosomes is completed in:

(Rawalpindi Board-2013-

- A)
 a) Leptotene b) Zygotene
 c) Pachytene d) Diplotene

5) Contractile ring in cytokinesis is formed by:

(Rawalpindi Board –New Pattern-2014-

- A)
 a) Tubulin b) Actin and
 Myosin
 d) Keratin d) Cyclin

6) The phase in meiosis I which may last for days, weeks or even years is:

(Rawalpindi Board –New Pattern-2014-

- A)
 a) Leptotene b) Zygotene
 c) Pachytene d) Diplotene

7) Mangolism is also known as:

(Rawalpindi Board-New Pattern-2015-

- A)
 a) Down's syndrome b) Klinefelter's
 syndrome
 c) Turner's syndrome d) Jacob's syndrome

8) Bivalent or Tetrads are formed in:

(Rawalpindi Board-New Pattern-2015-

- A)
 a) Leptotene b) Zygotene
 c) Pachytene d) Diakinesis

SARGODHA BOARD

1) Synapsis takes place in -----:

(Sargodha Board-2010-

- A)
 a) Leptotene b) Zygotene
 c) Pachytene d) Diakinesis

2) At cytokinesis, in plants, a membrane structure phragmoplast is formed from vesicles which originate from:

(Sargodha Board-2011-

- A)
 a) Lysosomes b) Endoplasmic
 Reticulum
 c) Golgi complex d) Centrioles

3) The microtubules are composed of a protein tubulin and traces of:

(Sargodha Board-2012-

- A)
 a) DNA b) NAD
 c) FAD d) RNA

4) The longest stage of Prophase I is:

(Sargodha Board-2013-

- A)
 a) Leptotene b) Zygotene
 c) Pachytene d) Diplotene

DERA GHAZI KHAN BOARD

1) Which structure becomes visible when cell starts dividing:

(Dera Ghazi Khan Board-2009-

- A)
 a) Nucleus b) Cell membrane
 c) Chromosome d) Nuclear membrane

2) The phase which can exist for life time of an organism is:

(Dera Ghazi Khan Board-2010-

- A)
 a) S—phase b) G²—phase
 c) G¹—phase d) G⁰—phase

3) Cell death due to tissue damage is called:

(Dera Ghazi Khan Board-2011-

- A)
 a) Apoptosis b) Metastasis
 c) Necrosis d) Suicide

4) Crossing over during meiosis occurs at the stage:

(D.G.K Board-Group-I-2012-

- A)
 a) Diplotene b) Pachytene
 c) Zygotene d) Leptotene

5) Phase of extensive metabolic activities in cell cycle,

is: (D.G.K Board-Group-II-2012-

- A)
 a) G₁ b) G₂
 c) S d) M

6) Spore formation in plants is the product of:

(D.G.K Board-Group-I-2013-

- A)
 a) Zygote b) Gametogenesis
 c) Mitosis d) Meiosis

7) It is the period of extensive metabolic activity

(D.G.K Board-Group-II-2013-

- A)
 a) G₁—phase b) S—phase
 c) G₂—phase d) G₀—phase

8) During cell division, the nuclear division is called:

(D.G.K. Board-New Scheme-Group-I-2014-

A)

- a) Cytokinesis b) Karyokinesis
c) Plasmolysis d) Diakinesis
- 9) The prophase stage in which the chromosomes become visible, shorten and thick:
(D.G.K. Board-New Scheme-Group-I-2014-
- A)
- a) Leptotene b) Zygotene
c) Pachytene d) Diplotene
- 10) In which stage of Meiosis, the paired chromosomes repel each other and begin to separate:
(D.G.K. Board-New Scheme-Group-II-2014-
- A)
- a) Leptotene b) Zygotene
c) Pachytene d) Diplotene
- 11) The phase of Mitosis which ensures equal distribution of chromatids in daughter cells is:
(D.G.K. Board-New Scheme-Group-II-2014-
- A)
- a) Prophase b) Metaphase
c) Anaphase d) Telophase
- 12) Which one sub-stage of Prophase I of Meiosis I lasts for days, weeks, or even years?
(D.G.K. Board-New Scheme-Group-I-2015-
- A)
- a) Zygotene b) Leptotene
c) Pachytene d) Diplotene
- 13) The Syndrome in which individual has short stature, webbed neck, without ovaries and complete absence of germ cells is:
(D.G.K. Board-New Scheme-Group-I-2015-
- A)
- a) Mongolism b) Klinefelter syndrome
c) Down's syndrome d) Turner's syndrome
- 14) The pairing of homologous chromosomes occurs during:
(D.G.K. Board-New Scheme-Group-II-2015-
- A)
- a) Leptotene b) Zygotene
c) Pachytene d) Diplotene
- 15) The stage of prophase that lasts for days, week or even year is:
(D.G.K. Board-New Scheme-Group-II-2015-
- A)
- a) Leptotene b) Zygotene
c) Pachytene d) Diplotene
- SAHIWAL BOARD**
- 1) The spreading of tumor cells an establishment of secondary areas of growth is called:
(Sahiwal Board-2013-
- A)
- a) Malignin b) Metastasis
c) Metamorphosis d) Benign
- 2) Mitotic apparatus is organized during:
(Sahiwal Board-New Scheme-2014-
- A)
- a) Prophase b) Metaphase
c) Anaphase d) Telophase
- 3) Each diploid cell after meiosis produces:
(Sahiwal Board-New Scheme-2014-
- A)
- a) Two cells b) Four cells
c) Six cells d) Eight cells

- 4) Cancer occurs due to error in:
(Sahiwal Baord-New Scheme-2015-

- A)
- a) Mitosis b) Meiosis
c) Binary fission d) Budding

- 5) Crossing over occurs during:
(Sahiwal Baord-New Scheme-2015-

- A)
- a) Diplotene b) Pachytene
c) Zygotene d) Leptotene

III) From Entry Test:-

- 1) Prophase, metaphase and telophase are subdivisions of:
(Entry Test-

- 2007)
- a) Mitosis b) Cytokinesis
c) Karyokinesis d) None of these

- 2) Exchange of segments between homologous chromosomes is called:
(Entry Test-

- 2012)
- a) Segregation c) Crossing over
b) Independent assortment d) Mutation

- 3) If a person has 44 autosomes + XXY, he will suffer from:

- (Entry Test-

- 2012)
- a) Klinefelter's syndrome c) Turner's syndrome

- c) Down's syndrome d) Edward's syndrome

- 4) In which stage of Interphase, there is an increase in

- cell size and many biochemicals are formed:
(Entry Test-

- 2012)
- a) G₂ phase c) S phase
b) G₁ phase d) C phase

- 5) In Down's syndrome, which one of the following pair of chromosome fails to segregate?

- (Entry Test-

- 2012)
- a) 7 c) 21
b) 15 d) 12

- 6) Cytokinesis is a division of:
(Sel-Test Questions-

- 2013)
- a) Cytoplasm c) Nucleus
b) Chromosomes d) Nucleolus

- 7) During cell division the plant cell is not seen to have:
(Self-Test Questions-

- 2013)
- a) Spindle fibers c) Centromere
b) Chromatids d) Centrioles

- 8) Which human disease is due to meiotic errors:
(Self-Test Questions-

- 2013)
- a) Typhoid c) Measles
b) Cholera d) Down's syndrome

C h a p t e r ----

VARIATION AND GENETICS

1 MCQ

I) From Exercise:-

- 1) When a single gene has multiple phenomenon is called:
 - a) Codominance
 - b) Epistasis
 - c) **Pleiotropy**
 - d) Sex-linkage
- 2) What happens when both alleles of a gene pair independently express in a heterozygote?
 - a) Dominance
 - b) Incomplete dominance
 - c) Over dominance
 - d) **Codominance**
- 3) A heterozygote offspring quantitatively exceeds the phenotypic expression of both the homozygote parents due to:
 - a) Dominance
 - b) Incomplete dominance
 - c) **Over dominance**
 - d) Codominance
- 4) How many gene pairs contribute to the wheat grain color?
 - a) One
 - b) Two
 - c) **Three**
 - d) Four
- 5) Who for the first time found white eye mutant in *Drosophila*?
 - a) Morgan
 - b) **Bridges**
 - c) Correns
 - d) De Varies
- 6) Which of the following traits is transmitted directly from affected father to only his sons?
 - a) Autosomal
 - b) X-linked
 - c) **Y-linked**
 - d) X and Y-linked
- 7) Which phenomenon reduces the chances of genetic recombination and variations among offspring?
 - a) **Linkage**
 - b) Crossing over
 - c) Independent assortment
 - d) Dominance
- 8) Which of the following traits is not sex-linked recessive?
 - a) Haemophilia
 - b) Color blindness
 - c) **Hypophosphatemic ricket**
 - d) tfm syndrome
- 9) Which of these traits zigzags from maternal grandfather through a carrier daughter to a grandson?
 - a) Autosomal
 - b) **X-linked**
 - c) Y-linked
 - d) X and Y
- 10) When a haemophilic carrier marries a normal man, who among her offspring may be affected?
 - a) Half her children
 - b) All her daughters
 - c) Half of her daughters
 - d) **Half of her sons**
- 11) What is the risk of a color-blind child in a family mother is color-blind but father is normal?
 - a) 100 %
 - b) 75 %

- c) 50 %
- d) 25 %
- 12) What is the risk of a color-blind child in a family father is color-blind but mother is normal?
 - a) **Zero %**
 - b) 25 %
 - c) 50 %
 - d) 100 %

II) From Punjab Boards:-

LAHORE BOARD

- 1) All the alleles found in a breeding population at a given time are collectively called the:
 - a) Polygene
 - b) **Gene pool**
 - c) Continuously varying trait
 - d) Multiple Alleles
- 2) A gene with multiple phenotypic effect is called:
 - a) Multiple allele
 - b) **Pleiotropic allele**
 - c) Polygenic allele
 - d) Bombay allele
- 3) ABO blood group system was discovered by:
 - a) Bernstein
 - b) Correns
 - c) Morgan
 - d) **Landsteiner**
- 4) Locus is a:
 - a) Part of DNA
 - b) **Position of a gene**
 - c) Partner of a gene
 - d) Complement of a gene
- 5) The individuals, which are universal recipients have:
 - a) A blood group
 - b) B blood group
 - c) **AB blood group**
 - d) O blood group
- 6) Bobbed gene in *Drosophila* is present on:
 - a) X chromosome
 - b) Y chromosome
 - c) **Both on X and Y**
 - d) Autosome
- 7) Novel phenotype of 4 O' clock plant flower is an example of:
 - a) Complete Dominance
 - b) Co-dominance
 - c) Over dominance
 - d) **Incomplete dominance**
- 8) About 50 % cases of MODY are caused by mutations in:
 - a) Kinase gene
 - b) Galactoxinase gene
 - c) **Glucokinase gene**
 - d) Proteinase gene
- 9) *Drosophila* males for eye color are:
 - a) Homozygous
 - b) Heterozygous
 - c) **Hemizygous**
 - d) None of these
- 10) All the genes found in a breeding population constitute:
 - a) Genotype
 - b) Genome
 - c) Gene frequency
 - d) **Gene Pool**
- 11) Secretors have dominant secretor Gene "Se" on chromosome:
 - a) 1
 - b) 2
 - c) 3
 - d) 4

(Lahore Board-New Scheme-Group-II-2014-

- A) a) 9 b) 19
c) 21 d) 24

GUJRANWALA BOARD

- 1) Different alleles of a gene that are both expressed in a heterozygous condition are called:
(Gujranwala Board-2008-

- A) a) Co-dominance b) Complete dominance
c) Over dominance d) Dominance
2) Secretors have dominant secretor gene "Se" on chromosome:
(Gujranwala Board-2009-

- A) a) 9 b) 19
c) 21 d) 24

- 3) Hypophosphatemic ricket is an X-linked ---- trait:
(Gujranwala Board-2009-

- A) a) Dominant b) Recessive
c) Both a and b d) None of these
4) The genic system for the determination of sex is present in:
(Gujranwala Board-2010-

- A) a) Ginkgo b) Yeast
c) Drosophila d) Protenor bug
5) ABO blood groups were discovered in 1901 by:
(Gujranwala Board-2011-

- A) a) Punnett b) Wiener
c) Burnstein d) Landsteiner
6) The blood serum containing antibodies is called:
(Gujranwala Board-2012-

- A) a) Antigen b) Immunoglobulin
c) Plasma d) Antiserum
7) A gamete without any sex chromosome is called:
(Gujranwala Board-2013-

- A) a) Autogamete b) Gamete
c) Nullogamete d) Sex-gamete
8) In 1901, ABO group system was discovered by:
(Gujranwala Board-New Scheme-2014-

- A) a) Punnett b) Karl Landsteiner
c) Bernstein d) Weiner
9) The position of a gene on the chromosome is called
its -----:
(Gujranwala Board-New Scheme-2015-

- A) a) Allele b) Phenotype
c) Locus d) Genotype

MULTAN BOARD

- 1) In 1925 the genetic basis of ABO system was

explained by: (Multan Board-2008-

- A) a) Landsteiner b) Bernstein
c) Levine d) Both a and b
2) A single gene with multiple phenotypic effects is described as:
(Multan Board-2008-

- S) a) Co-dominance b) Epistasis
c) Pleiotropy d) Gene linkage
3) Tongue rolling ability in human is due to a single gene:
(Multan Board-2009-

- A) a) Dominant b) Co-dominant
c) Recessive d) Over dominant
4) The contrasting pairs of alleles for all seven characters chosen by Mendel showed:
(Multan Board-2009-

- A) a) Over dominant b) Complete dominance
c) Incomplete dominance d) Co-dominance

- 5) All the genes /alleles found in a breeding population at a given population at a given time are collectively called: (Multan Board-2009-

- S) a) Polygenes b) Multiple alleles
c) Gene pool d) Linkage group
6) How many gene pairs contribute to the wheat grain color?
(Multan Board-2009-

- S) a) One b) Two
c) Three d) Four
7) Erythroblastosis foetalis can occur if marriage occurs between: (Multan Board-2010-

- A) a) Rh+ male, Rh+ female
b) Rh- male, Rh- female
c) Rh+ male, Rh- female
d) Rh- male, Rh+ female

- 8) Linkage groups in man are:
(Multan Board-2010-

- S) a) 21 b) 23
c) 46 d) 42
9) *Ascaris* incurve male has: (Multan Board-2011-

- A) a) 25 Chromosomes b) 30 Chromosomes
c) 35 Chromosomes d) 40 Chromosomes

- 10) The gene pairs which contribute wheat grain color are:
(Multan Board-2011-

- S) a) One b) Two
c) Three d) Four
11) A Y-linked trait; SRY on Y chromosome determines:
(Multan Board-2012-

- A) a) Femaleness b) Baldness
c) Maleness d) Deafness
12) A man with blood group AB can not be the father
of a son who has blood group:

(Multan Board-2012-

- S) a) "O" b) "AB"
c) "B" d) "A"

13) Hypophosphatemic rickets an X-linked:
(Multan Board-2013-

- A) a) Co-dominant trait b) Dominant trait
c) Over dominant trait d) Recessive trait

14) Man has linkage groups:
(Multan Board-Old Scheme-2014-

- A) a) 23 b) 46
c) 22 d) 92

15) Green color blindness is called:
(Multan Board-Old Scheme-2014-

- A) a) Deuteranopia b) Protanopia
c) Tritanopia d) Color blind

16) ABO blood group was discovered by:
(Multan Board-New Scheme-2015-

- A) a) Landsteiner b) Levine
c) Bernstein d) Waldayer

BAHAWALPUR BOARD

1) White eye gene in *Drosophila* also affects the shape

of: (Bahawalpur Board-2008-

- A) a) Archegonium b) Spermatheca
c) Skin color d) Stomach

2) Which one is the basic unit of biological information: (Bahawalpur Board-2009-

- A) a) Polygene b) Allele
c) Gene d) Poly trait

3) Genes keep on hopping on different loci are called:
(Bahawalpur Board-2009-

- A) a) Alleles b) Multiple alleles
c) Jumping genes d) Both a and b

4) Green color blindness is called:
(Bahawalpur Board-2009-

- S) a) Protanopia b) Tritanopia
c) Deuteranopia d) All these

5) Which syndrome is rare X-linked recessive trait:
(Bahawalpur Board-2010-

- A) a) Testicular Feminization b) Diabetes
c) Color blindness d) Hemophilia

6) Gene for eye color in *Drosophila* is located on:
(Bahawalpur Board-2010-

- S) a) X Chromosome b) Y Chromosome
c) Two pair of Autosomes
d) One pair of Autosomes

7) What is the risk of a color blind child in family when father is color blind but mother is normal:
(Bahawalpur Board-2011-

- A) a) 0 % b) 25 %

- c) 50 % d) 100 %

8) The sex chromosomes were discovered by:
(Bahawalpur Board-2012-

- A) a) Sutton b) Morgan
c) Jordon d) Correns

9) Eggs are Sex Determining Factor in:
(Bahawalpur Board (A)

- 2013) a) Moth b) *Drosophila*
c) Ascaris d) Man

10) The position of gene on chromosome is called:
(Bahawalpur Board (New Scheme) 2014-

- A) a) Habitat b) Locus
c) Allele d) Focus

11) Blue cone monocracy is X-linked trait in which:
(Bahawalpur Board-New Scheme-2015-

- A) a) Red Cone Cells are absent
b) Green Cone Cells are absent
c) Both Red an Green Cone Cells are absent.
d) Blue Cone Cells are absent

FAISALABAD BOARD

1) The contrasting pairs of allele for all the seven characters chosen by: (Faisalabad Board-2008-

- A) a) Over dominance b) Co-dominance
c) Complete dominance
d) Incomplete dominance

2) Two normal (Aa) parents have chance of albino child:
(Faisalabad Board-2009-

- A) a) 25 % b) 50 %
c) 75 % d) 100 %

3) Each type of cone cell in retina has specific light absorbing protein called:
(Faisalabad Board-2009-

- A) a) Albumin b) Chlorine
c) Haemolin d) Opsin

4) Genes keep on hopping on different loci:
(Faisalabad Board-2010-

- A) a) Polygene b) Multiple allele
c) Jumping gene d) SRY

5) The genic system for determination of sex is present in: (Faisalabad Board-2011-

- A) a) *Ginkgo* b) *Drosophila*
c) *Ascaris* d) Yeast

6) The universal donor blood group is:
(Faisalabad Board-2012-

- A) a) A b) B
c) AB d) O

7) This cross finds out the homozygous or heterozygous nature of the genotype:
(Faisalabad Board-2013-

- A) a) Self cross b) Back cross
c) Test cross d) Dihybrid cross

8) ABO blood groups were discovered by:

(Faisalabad Board-Old Scheme-2014-

- A) a) Wiener b) Landsteiner
c) Punnett d) Burnstein
- 9) Which trait is transmitted directly from an affected father to only his sons?
(Faisalabad Board-New Scheme-2014)
- a) X-linked b) Y-linked
c) Autosomal d) X and Y linked
- 10) MN blood group is an example of:
(Faisalabad Board-New Scheme-2015-
- A) a) Complete dominance b) Codominance
c) Incomplete dominance d) Over dominance

RAWALPINDI BOARD

- 1) The basic unit of biological information is:
(Rawalpindi Board-2010-
- A) a) Gene b) Locus
c) Chromosome d) Allele
- 2) Green color blindness is called:
(Rawalpindi Board-2011-
- A) a) Deuteranopia b) Tritanopia
c) Tetranopia d) Protanopia
- 3) Secretors have dominant secretor gene "Se" on chromosome:
(Rawalpindi Board-2012-
- A) a) 18 b) 19
c) 20 d) 21
- 4) Diabetics are unable to metabolize blood:
(Rawalpindi Board-2013-
- A) a) Urea b) Protein
c) Fat d) Sugar
- 5) ABO blood group system in man is encoded by a polymorphic gene I on chromosome:
(Rawalpindi Board-New Pattern-2014-
- A) a) 7 b) 9
c) 21 d) X
- 6) Chances of genetic recombination are minimized due to: (Rawalpindi Board-New Pattern-2015-
- A) a) Crossing over
b) Independent assortment of chromosomes
c) Mutation
d) Gene linkage

SARGODHA BOARD

- 1) Secretor gene "Se" is present on chromosome:
(Sargodha Board-2010-
- A) a) 11 b) 19
c) 21 d) 23
- 2) About 50 % of MODY are caused by mutation in:
(Sargodha Board-2011-
- A) a) Kinase gene b) Galactoxinase
c) Hexo-isomerase gene d) Glucokinase gene

- 3) Human skin color is controlled by:
(Sargodha Board-2012-

- A) a) Two to four b) Three to six
c) Four to six d) Seven to eight
- 4) When different alleles of a gene are expressed in a heterozygous conditions, it is called:
(Sargodha Board-2013-
- A) a) Dominance b) Co-dominance
c) Over dominance d) Epistasis

DERA GHAZI KHAN BOARD

- 1) Melanocyte failure in cat causes white fur and:
(Dera Ghazi Khan Board-2009-
- A) a) Blindness b) Deafness
c) Pigmentation d) None of these
- 2) How many linkage groups man has:
(Dera Ghazi Khan Board-2009-
- A) a) 21 b) 23
c) 25 d) 27
- 3) Deuteranopia is a blindness of color for:
(Dera Ghazi Khan Board-2010-
- A) a) Red b) Blue
c) Green d) Yellow
- 4) When a gene or gene pair at one locus, interferes with or hides the effect caused by another gene or gene pair at another locus, the phenomenon is:
(Dera Ghazi Khan Board-2011-
- A) a) Pleiotrophy b) Epistasis
c) Co-dominance d) Dominance
- 5) The best example of inheritance of multiple alleles is:
(D.G.K Board-Group-I-2012-
- A) a) MN-blood type b) Rh-blood type
c) ABO-blood type d) MNS-blood type
- 6) Example of sex limited trait in man is:
(D.G.K Board-Group-II-2012-
- A) a) Color blindness b) Baldness
c) Beard d) Long hair
- 7) Genes for albinism is located on:
(D.G.K Board-Group-I-2013-
- A) a) X Chromosome b) Y Chromosome
c) Chromosome No: 11
d) Chromosome No: 22
- 8) ABO blood system was discovered by:
(D.G.K Board-Group-II-2013-
- A) a) Mendel b) K. Landsteiner
c) Sutton d) Correns

9) Incomplete dominance was discovered by 4'O Clock plant in 1899 by:
(D.G.K Board-New Scheme-Group-I-2014-

- A) a) Deveries b) Jhannsen
c) Carl Correns d) Tscharrmach

10) The cross which is used to find out the homozygous or heterozygous nature of the genotype is called:
(D.G.K Board-New Scheme-Group-II-2014-

- A) a) Test cross b) Reciprocal cross
c) Monohybrid cross d) Dihybrid cross

11) Different alleles of a gene that are both expressed in a heterozygous condition are called:
(D.G.K Board-New Scheme-Group-I-2015-

- A) a) Co-dominance b) Dominate
c) Over-dominance d) Incomplete dominance

12) The gene for blue opsin is present on autosome:
(D.G.K Board-New Scheme-Group-II-2015-

- A) a) 7 b) 11
c) 19 d) 21

SAHIWAL BOARD

1) The genic system for determination of sex is present in:
(Sahiwal Board-2013-

- A) a) Ginkgo b) Ant
c) Ascaris d) Yeast

2) ABO blood group system is enclosed by a single polymorphic gene with:
(Sahiwal Board-New Scheme-2014-

- A) a) Three multiple alleles b) Four multiple alleles
c) Five multiple alleles d) Six multiple alleles

3) The form of appearance of the trait is called:
(Sahiwal Board-New Scheme-2015-

- A) a) Genotype b) Phenotype
c) Karyotype d) Heterozygous genotype

III) From Entry Test:-

1) In moths, male is: (Entry Test-2007)

- a) Heterogametic c) Homogametic
b) Dieogametic d) Both b and c

2) The genes of blue opsins is present on: (Entry Test-2007)

- a) Autosome 9 c) Autosome 1
b) Autosome 7 d) Autosome 3

3) Position of a gene on the chromosome is called its: (Entry Test-2007)

- a) Phenotype c) Junction
b) Locus d) Genotype
- 4) The color phenotype of the grain is the sum of

individual effects of ---- alleles: (Entry Test-2007)

- a) Six c) Four
b) Five d) Five or three

5) When the presence of a gene at one locus suppresses the effect of a gene at another locus, the phenomenon is called: (Entry Test-2012)

- a) Hypostasis c) Epistasis
b) Pleiotropy d) Epitropy

6) The gene for ABO blood group system in humans is

is represented by symbol: (Entry Test-2012)

- a) X c) Y
b) I d) O

7) In men, sex determination depends upon the nature of: (Entry Test-2012)

- a) Heterogametic male
b) Monogametic female
c) Heterogametic female
d) Monogametic male

8) When a single gene effects two or more traits, the phenomenon is called: (Entry Test-2012)

- a) Epistasis c) Dominance
b) Pleiotropy d) Over dominance

9) A gene which has multiple phenotypic effect is called: (Self-Test Questions-2013)

- a) Pleiotropic c) Multiple allele
b) Epistasis d) Locus

10) Change in the nature of gene is known as: (Self-Test Questions-2013)

- a) Incomplete dominance c) Mutation
b) Pleiotropy d) Polygenic trait

C h a p t e r ----

23

BIOTECHNOLOGY

1 MCQ

I) From Exercise:-

1) Which of these is a true statement?

- a) Both plasmids and viruses can serve as vector.
b) Plasmids can carry recombinant DNA but viruses can not.
c) Vectors can carry only the foreign gene into the host cell.
d) Only gene therapy uses vectors.
e) Both c and d are correct.

2) Which of these is a benefit to having insulin produced by biotechnology?

- a) It is just as effective
b) It can be mass produced

- c) It is non-allergic
d) It is less expensive
e) **All of these are correct**
- 3) **Restriction fragment length polymorphism (RFLPs):**
a) Are achieved by using restriction enzymes
b) Identify individuals genetically
c) Are the basis for DNA finger prints
d) Can be subjected to gel electrophoresis
e) **All of these are correct**
- 4) **Which of these would you not expect to be a biotechnology product?**
a) Vaccine
b) Modified enzyme
c) **DNA probes**
d) Protein hormones
e) Steroid hormones
- 5) **What is the benefit of using a retrovirus as a vector in gene therapy?**
a) It is not able to enter cells.
b) It incorporates the foreign gene into the host chromosome.
c) It eliminates a lot of unnecessary steps
d) It prevents infection by other viruses
e) **Both b and c are correct**
- 6) **Gel electrophoresis:**
a) Can not be used on nucleotides
b) Measures the size of plasmids
c) Tells whether viruses are infectious
d) **Measure the change and size of proteins and DNA fragments**
e) All of these are correct
- 7) **Which of these is incorrectly matched?**
a) Protoplast - Plant cell engineering
b) RFLPs ----- DNA finger printing
c) DNA polymerase --- PCR
d) **DNA ligase -- Mapping human chromosomes**

II) From Punjab Boards:-

LAHORE BOARD

- 1) **The enzyme that extracted from *Thermos equatius* bacterium is:** (Lahore Board-2008-
A)
a) DNA polymerase
b) **Taq polymerase**
c) DNA polymerase and Taq polymerase
d) RNA polymerase
- 2) **Cystic fibrosis patients lack a gene that codes for trans-membrane carrier of:** (Lahore Board-2009-
A)
a) Calcium ions
b) Sodium ions
c) **Chloride ion**
d) Potassium ion
- 3) **The first restriction enzyme was isolated by:** (Lahore Board-2010-
A)
a) Kary Mullis
b) **Hamilton**
d) Sanger
d) Maxam
- 4) **A full set of gene of an individual is called:** (Lahore Board-2011-
A)
a) Gene pool
b) **Genome**

- c) Phenotype
d) Genotype
- 5) **Polyhydroxy butyrate is called:** (Lahore Board-Group-I-2012-
A)
a) Antithrombin III
b) Nutra Sweet
c) **Biodegradable plastic**
d) Luciferin
- 6) **A balloon catheter is used to treat a problem of:** (Lahore Board-Group-II-2012-
A)
a) SCID
b) Hypercholesterolemia
c) Cystic fibrosis
d) **Closed artery**
- 7) **Children with severe combined immunodeficiency syndrome (SCID) lack enzyme:** (Lahore Board-Group-I-2013-
A)
a) **Adenosine deaminase (ADA)**
b) LH
c) FSH
d) Vasopressin
- 8) **Aspartame is a:** (Lahore Board-Group-II-2013-
A)
a) **Dipeptide**
b) Tripeptide
c) Pentapeptide
d) Polypeptide
- 9) **Soybeans have been made resistant to a common:** (Lahore Board-Old Scheme-Group-II-2014-
A)
a) **Herbicide**
b) Fungicide
c) Pesticide
d) Insecticide
- 10) **Genomic library is a collection of bacterial or bacteriophage:** (Lahore Board-New Scheme-Group-I-2014-
A)
a) Genotype
b) **Genome**
c) Gene pool
d) Clones
- 11) **In 1958, F.C. Steward grew a complete carrot plant from tiny piece of:** (Lahore Board-New Scheme-Group-II-2014-
A)
a) Pith
b) Cortex
c) Xylem
d) **Phloem**

GUJRANWALA BOARD

- 1) **Natural extra chromosomal circular DNA in bacteria are called:** (Gujranwala Board-2008-
A)
a) Endonucleases
b) Restriction enzymes
c) **Plasmids**
d) Phage viruses
- 2) **Which one is the human smallest chromosome?** (Gujranwala Board-2009-
A)
a) 12
b) 14
c) 20
d) **22**
- 4) **A genome is a full set of genes of:** (Gujranwala Board-2010-
A)

c) Calcium chloride d) Potassium chloride
 6) Which of the enzymes act molecular scissors:
 (Rawalpindi Board –New Pattern-2015-

- A)
 a) DNA ligase b) Restriction endonucleases
 c) DNA polymerase d) RNA polymerase

SARGODHA BOARD

1) DNA polymerase is extracted from:
 (Sargodha Board-2010-

- A)
 a) Virus b) Bacteria
 c) Fungi d) Protists
 2) An antibody made by soybean can be made as treatment for:
 (Sargodha Board-2011-

A)
 a) AIDS b) Herpes simplex
 c) Genital herpes d) Hepatitis C
 4) PSC 101 has antibiotic resistance gene for:
 (Sargodha Board-2012-

- A)
 a) Tetracycline b) Ampicillin
 c) Neomycin d) Ergotrine
 5) Which of the following is produced by transgenic plants as well as transgenic bacteria:
 (Sargodha Board-2013-

- A)
 a) Antibodies b) Hepatitis B vaccine
 c) Insulin d) Human growth hormone

DERA GHAZI KHAN BOARD

1) The growth of a tissue in an artificial medium is called:
 (Dera Ghazi Khan Board-2009-

- A)
 a) Cloning b) Tissue culture
 c) Gene therapy d) Angioplasty
 2) Antithrombin III for preventing blood clots during surgery is currently being produced by a herd of:
 (Dera Ghazi Khan Board-2010-

A)
 a) Cats b) Dogs
 c) Cows d) Goats
 3) The enzyme luciferase is produced by an insect commonly known as the:
 (Dera Ghazi Khan Board-2011-

- A)
 a) House fly b) Butter fly
 c) Caddis fly d) Fire fly
 4) Gene of interest is joined to the open ends of plasmids by:
 (D.G.K Board-Group-I-2012-

- A)
 a) DNA ligase b) DNA polymerase
 c) RNA polymerase d) Helicase
 5) DNA polymerase enzyme is extracted from:
 (D.G.K Board-Group-II-2012-

a) Viruses b) Fungi
 c) Animals d) Bacteria
 6) Taq polymerase was isolated from:
 (D.G.K Board-Group-I-2013-

- A)
 a) Viruses b) Bacteria
 c) Plants d) Algae
 7) Aspartame is a:
 (D.G.K Board-Group-II-2013-

A)
 a) Monopeptide b) Dipeptide
 c) Tripeptide d) Polypeptide
 8) Recombinant DNA is introduced into the host cell by means of a:
 (D.G.K Board-New Scheme-Group-I-2014-

- A)
 a) Vector b) Phage
 c) Bacterium d) Fungus
 9) The enzyme which joins two pieces of DNA, is:
 (D.G.K Board-New Scheme-Group-II-2014-

A)
 a) DNA polymerase I b) DNA ligase
 c) Restriction endonuclease
 d) DNA polymerase III
 10) Cystic fibrosis patients lack a gene that codes for trans-membrane carrier of the:
 (D.G.K Board-New Scheme-Group-I-2015-

- A)
 a) Sodium ions b) Chloride ions
 c) Calcium ions d) Potassium ions
 11) Adult transgenic tobacco plants glowed when sprayed with the substrate:
 (D.G.K Board-New Scheme-Group-II-2015-

A)
 a) Luciferin b) Myoglobin
 c) Haemoglobin d) Methionine

SAHIWAL BOARD

1) Which one is not biotechnology product:
 (Sahiwal Board-2013-

- A)
 a) Hepatitis B vaccine
 b) Tissue plasminogen activator
 c) Human growth hormone
 d) Hemophilia factor I
 2) Taq polymerase is obtained from:
 (Sahiwal Board-New Scheme-2014-

A)
 a) Fungus b) Algae
 c) Bacterium d) Virus
 3) The enzymes which are used to cut out the gene of interest are known as:
 (Sahiwal Board-New Scheme-2015-

- A)
 a) DNA ligase b) DNA polymerase
 c) RNA polymerase d) Restriction endonuclease

III) From Entry Test:-

- 1) The cell suspension culture of ----- produces quinine: (Entry Test-2007)
 a) Soybean c) *Digitalis lanata*

- b) *Cinchona ledgeriana* d) Luciferin
- 2) In recombinant DNA technology ----- are tools for manipulating DNA: (Entry Test-2012)
- a) Viruses c) Enzymes
b) Chromosomes d) Genes
- 3) In DNA finger printing, the use of ----- produces distinctive pattern of autoradiography or x-ray film: (Entry Test-2012)
- a) Restriction enzymes
b) Microsatellites
c) Macrosatellites
d) Probes for genetic marker
- 4) In the recombinant DNA technology, plasmids are used as: (Entry Test-2012)
- a) Genetic material c) Vectors
b) Enzymes d) Probes
- 5) In which process multiple copies of desired genes are produced? (Entry Test-2012)
- a) Polymerase chain reaction
b) Gene sequencing
c) Analyzing DNA
d) DNA finger printing
- 6) The enzyme adenosine deaminase is missing in persons suffering from: (Entry Test-2012)
- a) Cystic fibrosis
b) Hypercholesterolemia
c) Severe combined immunodeficiency syndrome
d) Parkinson's disease
- 7) Enzymes restriction endonucleases were isolated from: (Self-Test Questions-2013)
- a) Viruses c) Fungi
b) Bacteria d) Protozoa
- 8) During polymerase chain reaction, how DNA double helix is separated: (Self-Test Questions-2013)
- a) By heat treatment
b) By use of enzyme DNA polymerase
c) By use of enzyme DNA Helicase
d) By use of enzyme DNA ligase
- 9) Which enzyme is used to join the desired gene into the plasmid DNA during genetic engineering: (Self-Test Questions-2013)
- a) DNA Helicase c) DNA polymerase
b) DNA Ligase d) Taq polymerase
- 10) Which of the following is an example of benefits of transgenic organisms produced through genetic engineering: (Self-Test Questions-2013)
- a) Production of antibiotics

- b) Production of insulin
c) Production of anti-rabies vaccine
d) Production of anti-malarial drugs
- 11) In cystic fibrosis transmission of which ion is faulty, resulting into the production of disease: (Self-Test Questions-2013)
- a) Chloride c) Calcium
b) Fluoride d) Magnesium

C h a p t e r ---- 24

EVOLUTION

1 MCQ

I) From Exercise:-

- 1) The gill pouches of mammals and birds' embryos are:
- a) Supportive "Ontogeny recapitulates phylogeny"
b) Homologous structures
c) Used by the embryos to breathe
d) Evidence for the degeneration of unused body parts
- 2) Darwin's theory, as represented in "The Origin of Species," mainly concerned:
- a) How new species arise
b) The origin of life
c) How adaptations evolve
d) How extinctions occur
e) The genetics of evolution
- 3) The smallest biological unit that can evolve over time is:
- a) A particular cell
b) An individual organism
c) A population
d) A species
e) An ecosystem
- 4) A gene pool consists of:
- a) All the alleles exposed to natural selection
b) The total of all alleles present in a population
c) The entire genome of a reproducing individual
d) The frequencies of the alleles for a gene locus within a population
e) All the gametes in a population
- 5) In a population with two alleles for a particular locus B and b, the allele frequency of B is 0.7. What would be the frequency of heterozygote if the population is in Hardy-Weinberg equilibrium?
- a) 0.7 b) 0.42
c) 0.49 d) 0.09 e) 0.21
- 6) In a population that is in Hardy-Weinberg equilibrium, 16 % of the individuals show the recessive trait. What is the frequency of the dominant allele in the population?
- a) 0.84 b) 0.36
c) 0.6 d) 0.4 e) 0.48
- 7) Selection acts directly on:
- a) Phenotype b) Genotype

- c) The entire genome d) Each allele
e) The entire gene pool

II) From Punjab Boards:-**LAHORE BOARD**

- 1) In a population with two alleles for a particular locus B and b, the allele frequency of B is 0.7.

What

would be the frequency of heterozygote if the population is in Hardy-Weinberg equilibrium:
(Lahore Board-2008-

- A) a) 0.42 b) 0.49
c) 0.03 d) 0.21

- 2) Archeobacteria can tolerate temperature upto:
(Lahore Board-2009-

- A) a) 100 °C b) 130 °C
c) 150 °C d) 120 °C

- 3) The main reason for the extinction of species is:
(Lahore Board-2010-

- A) a) Population b) Overproduction
c) Habitat destruction d) Parasitism

- 4) Wallace developed a theory of natural selection essentially identical to: (Lahore Board-2011-

- A) a) Lamarck b) Linnaeus
c) Darwin d) Hutton

- 5) Essay on the principle of population was published by:
(Lahore Board-Group-I-2012-

- A) a) Darwin b) Wallace
c) Linnaeus d) Malthus

- 6) Endosymbiont hypothesis was proposed by:
(Lahore Board-Group-II-2012-

- A) a) Cuvier b) Lyell
c) Margulis d) Malthus

- 7) The armored mammal that lives in America is:
(Lahore Board-Group-I-2013-

- A) a) Echidna b) Pangolin
c) Porcupine d) Armadillo

- 8) Respiratory protein found in all aerobic species is:
(Lahore Board-Group-II-2013-

- A) a) Cytochrome a b) Cytochrome b
c) Cytochrome c d) Cytochrome a₃

- 9) Eukaryotes are thought to have first appeared about:
(Lahore Board-Old Scheme-Group-II-2014-

- A) a) 3.5 billion years b) 1.5 billion years
c) 420 million years d) 150 million years

- 10) Archeobacteria can tolerate Temperature: about:

(Lahore Board-New Scheme-Group-I-2014-

- A) a) 45 °C b) 85 °C
c) 100 °C d) 120 °C

- 11) Darwin's "Origin of Species" was published in: about:

(Lahore Board-New Scheme-Group-II-2014-

- A) a) 1840 b) 1859
c) 1865 d) 1890

GUJRANWALA BOARD

- 1) The group of interbreeding individual belonging to

a particular species and sharing a common geographic area are called:

(Gujranwala Board-2008-

- A) a) Species b) Population
c) Individual d) None of these

- 2) Eukaryotes are thought to have first appeared about ----- billion years ago:

(Gujranwala Board-2009-

- A) a) 1.5 b) 2.5
c) 3.5 d) 4.5

- 3) In a population that is in Hardy-Weinberg equilibrium, 16 % of the individuals show the recessive trait. What is the frequency of the dominant allele in the population:

(Gujranwala Board-2010-

- A) a) 0.48 b) 0.36
c) 0.84 d) 0.4

- 4) According to endosymbiont hypothesis, the aerobic

bacteria developed into:

(Gujranwala Board-2011-

- A) a) Ribosomes b) Lysosomes
c) Mitochondria d) Golgi apparatus

- 5) Armadillo, the armored mammals live only in:

(Gujranwala Board-2012-

- A) a) Europe b) America
c) Australia d) Asia

- 6) Acquired characteristics of an individual cannot be:

(Gujranwala Board-2013-

- A) a) Inherited b) Flourished
c) Lost d) Migrated

- 7) In natural selection, the environment plays role affecting the proportions of gene in:

(Gujranwala Board-New Scheme-2014-

- A) a) Population b) Community
c) Area d) Biome

8) Zoos and botanical gardens are to save species extinction is:

(Gujranwala Board-New Scheme-2015-

- A) a) Permanent b) Dominant
c) **Imminent** d) Prominent

MULTAN BOARD

1) Emigration and immigration of members of a population, cause disturbance in the:

(Multan Board-2008-

- A) a) Genetic drift b) Genotype
c) **Gene pool** d) Phenotype

2) Endosymbiont hypothesis was proposed by:

(Multan Board-2008-

- S) a) Wallace b) **Lynn**
c) Lamarck d) Linnaeus

Morgulis

3) Variations are raw material for:

(Multan Board-2009-

- A) a) Mutation b) **Evolution**
c) Adaptation d) Migration

4) Endosymbiont hypothesis was proposed by:

(Multan Board-2009-

- S) a) A. R. Wallace b) **Lynn**
c) Darwin d) Lamarck

Morgulis

5) In a population that is in Hardy-Weinberg equilibrium, 16 % of the individuals show the recessive trait. What is the frequency of the dominant allele in the population:

(Multan Board-2010-

- A) a) 0.84 b) **0.48**
c) 0.36 d) 0.16

6) Endosymbiont hypothesis was proposed by:

(Multan Board-2010-

- S) a) Wallace b) **Lyell**
c) Lamarck d) **Lynn**

Morgulis

7) Which of the following believe in theory of special creation?

(Multan Board-2011-

- A) a) **Linnaeus** b) Darwin
c) **Lyell** d) Lamarck

8) Lamarck was in charge of invertebrate collection at the Natural History Museum in:

(Multan Board-2011-

- S) a) **Paris** b) London
c) Berlin d) Bonn

9) A species which is in imminent danger of extinction throughout its range is called:

(Multan Board-2012-

- A) a) Scarce Species b) **Threatened Species**

- c) Rare Species d) Endangered Species

10) The total aggregation of genes in a population at any time is called:

(Multan Board-2012-

- S) a) Genome b) Succession
c) **Gene pool** d) Gene flow

11) The change in a frequency of allele at a locus that occurs by chance is called:

(Multan Board-2013-

- A) a) Gene pool b) Genetic
c) **Genetic drift** d) Mutation

12) The ultimate source of all changes is:

(Multan Board-Old Scheme-2014-

- A) a) **Mutation** b) Migration
c) Genetic drift d) Selection

13) According to Endosymbiont Hypothesis, the aerobic bacteria developed into:

(Multan Board-New Scheme-2014-

- A) a) Ribosome b) Lysosome
c) **Mitochondria** d) Golgi Apparatus

14) A change in frequency of alleles at a locus that occurs by chance, is called:

(Multan Board-New Scheme-2015-

- A) a) Mutation b) **Genetic drift**
c) Migration d) Selection

BAHAWALPUR BOARD

1) Archeobacteria can tolerate high temperature upto:

(Bahawalpur Board-2009-

- A) a) 130 °C b) 100 °C
c) **120 °C** d) 115 °C

2) A respiratory protein found in all aerobic species is:

(Bahawalpur Board-2009-

- S) a) Cytochrome a b) Cytochrome b
c) **Cytochrome c** d) Cytochrome d

3) Organs functionally alike but structurally different are:

(Bahawalpur Board-2010-

- A) a) Homologous b) **Analogous**
c) Heterologous d) Isologous

4) The integration of the principle of genetics and evolution is called:

(Bahawalpur Board-2010-

- S) a) Neo Darwinism
b) Theory of Natural Selection
c) Lamarckism
d) Mendelian

5) In human beings, the Eustachian Tube connects the ear with the:

(Bahawalpur Board-2011-

- A) a) **Throat** b) Trachea
c) Nasal Cavity d) Ear

6) The Vermiform Appendix is vestigial organ in:

(Bahawalpur Board-2012-

- A) a) **Carnivores** b) Fungivores
c) Herbivores d) Omnivores

6) Ultimate Source of Evolution is:
(Bahawalpur Board-2013-

- A)
a) Selection b) Mutation
c) Migration d) Random mating

7) A respiratory protein which is present in all aerobic organisms is:
(Bahawalpur Board-New Scheme-2014-

- A)
a) Hemoglobin b) Myoglobin
c) Cytochrome a d) Cytochrome c

8) Among the Scientists who believed in divine creation was ----- :
(Bahawalpur Board-New Scheme-2015-

- A)
a) Charles Darwin b) Carlous
Linnaeus
c) Alfred Wallace d) Jean Lamarck

FAISALABAD BOARD

1) The rudimentary structures that had important function in ancestors in the remote past are said to be:
(Faisalabad Board-2008-

- A)
a) Visceral organs b) Vestigial organs
c) Assimilatory organs d) Functional organs

2) Gill pouches in humans develop into:
(Faisalabad Board-2009-

- A)
a) Pharynx b) Larynx
c) Syrinx d) Eustachian tube

3) Endosymbiont theory explains origin of:
(Faisalabad Board-2010-

- A)
a) Cell b) Prokaryotic cell
c) Eukaryotic cell d) Ribosome

4) The ultimate source of all evolutionary changes, which affect gene frequency, is:
(Faisalabad Board-2011-

- A)
a) Selection b) Migration
c) Mutation d) Genetic drift

5) An essay on the Principle of Population was published by:
(Faisalabad Board-2012-

- A)
a) Sutton b) Lyell
c) Malthus d) Darwin

6) Which scientist believed in divine creation?
(Faisalabad Board-2013-

- A)
a) Linnaeus b) Darwin
c) Lyell d) Cuvier

7) Essay on the Principle of Population was published by:
(Faisalabad Board-Old Scheme-2014-

- A)
a) Sutton b) Darwin
c) Lyell d) Malthus

8) A group of bacteria that can tolerate temperature

up to 120 °C:
(Faisalabad Board-New Scheme-2014-

- A)
a) Eubacteria b) *Mycoplasma*
c) Archaeobacteria d) *E.coli*

9) A respiratory protein which is present in all aerobic species is:
(Faisalabad Board-New Scheme-2015-

- A)
a) Hemoglobin b) Myoglobin
c) Cytochrome a d) Cytochrome c

RAWALPINDI BOARD

1) Who out of the following scientists believed in Divine Creation? (Rawalpindi Board-2010-

- A)
a) Darwin b) Lamarck
c) Linnaeus d) Wallace

2) The vermiform appendix is a vestigial organ in:
(Rawalpindi Board-2011-

- A)
a) Herbivores b) Carnivores
c) Omnivores d) Fungivores

3) Eustachean tubes connect throat with:
(Rawalpindi Board-2012-

- A)
a) Eyes b) Middle ear
c) Nose d) Tongue

4) The change in frequency of alleles at a locus that occurs by chance is: (Rawalpindi Board-2013-

- A)
a) Gene pool b) Mutation
c) Migration d) Genetic drift

5) In terrestrial vertebrates, gill pouches develop into:
(Rawalpindi Board –New Pattern-2014-

- A)
a) Gills b) Lungs
c) Nose d) Eustachian tube

6) Who published an essay on “The Principle of Population”?
(Rawalpindi Board –New Pattern-2015-

- A)
a) Lyell b) Darwin
c) Malthus d) Mendel

SARGODHA BOARD

1) Lyell published the principle of -----:
(Sargodha Board-2010-

- A)
a) Population b) Community
c) Biome d) Geology

2) A species which is in imminent danger of extinction through its range is called:
(Sargodha Board-2011-

- A)
a) Scare species b) Threatened species
c) Rare species d) Endangered species

3) The ultimate source of all changes is:
(Sargodha Board-2012-

- A)
a) Evolution b) Mutation

- c) Genetic drift d) Migration
- 4) The first person who argued with evidences that species have undergone evolution and were not specially created in their present form, was:
(Sargodha Board-2013-
- A)
- a) Aristotle b) Darwin
c) Linnaeus d) Lamarck

DERA GHAZI KHAN BOARD

- 1) Which one of the following is not declared as extinct species in Pakistan:
(Dera Ghazi Khan Board-2009-
- A)
- a) Indian Rhino b) Asian lion
c) Cheetah d) Green parrot
- 2) In a population with two alleles for a particular locus B and b, the allele frequency of B is 0.7. What would be the frequency of heterozygote if the population is in Hardy-Weinberg equilibrium?
(Dera Ghazi Khan Board-2010-
- A)
- a) 0.09 b) 0.21
c) 0.42 d) 0.49
- 3) The armored mammal that lives only in America is the:
(Dera Ghazi Khan Board-2011-
- A)
- a) Armadillo b) Penguin
c) Echidna d) Porcupine
- 4) Carolus Linnaeus believed in:
(D.G.K Board-Group-I-2012-
- A)
- a) Natural Selection b) Special Creation
c) Uniformitarianism
d) Inheritance of Acquired Characters
- 5) Ultimate source of evolution is:
(D.G.K Board-Group-II-2012-
- A)
- a) Migration b) Mutation
c) Random mating d) Selection
- 6) Ancestors of all life forms:
(D.G.K Board-Group-I-2013-
- A)
- a) Algae b) Virus
c) Prokaryotes d) Fungi
- 7) Who published the essay on the "Principle of Population":
(D.G.K Board-Group-II-2013-
- A)
- a) Wallace b) Lamarck
c) Malthus d) Lyell
- 8) Who believed in theory of Special Creation:
(D.G.K Board-Group-I-2014-
- A)
- a) Lamarck b) Darwin
c) Carlous Linnaeus d) Lyell
- 9) A group of interbreeding individuals belonging to a

particular species and sharing a common geographic area is called:
(D.G.K Board-New Scheme-Group II-2014-

- A)
- a) Community b) Population
c) Ecosystem d) Biosphere
- 10) Tubes that connect the middle air with throat in humans are called:
(D.G.K. Board-New Scheme-Group-I-2015-
- A)
- a) Eustachian tube b) Neural tube
c) Fallopian tube d) Nephridial tube
- 11) In human, eustachian tubes connect middle ear with:
(D.G.K. Board-New Scheme-Group-II-2015-
- A)
- a) Nose b) Eye
c) Throat d) Brain

SAHIWAL BOARD

- 1) Emigration and immigration of members of a population cause disturbance in the:
(Sahiwal Board-2013-
- A)
- a) Genotype b) Phenotype
c) Gene pool d) Genetic drift
- 2) Book "The Origin of Species" was written by:
(Sahiwal Board-New Scheme-2014-
- A)
- a) Linnaeus b) Darwin
c) Lamarck d) Wallace

III) From Entry Test:-

- 1) ----- organs are functionally different but structurally alike:
(Entry Test-2007)
- a) Analogous c) Homologous
b) Unilgous d) Hypologous
- 2) The comparative embryology of all vertebrates development of:
(Entry Test-2012)
- a) Mars c) Stales
b) Gill pouches d) Fins
- 3) The branch of biology that provides evidence through fossil record is called:
(Self-Test Questions-2013)
- a) Vestigial strucutres c) Biogeography
b) Comparative anatomy d) Palaentology
- 4) One of the factors given below does not effect gene frequency:
(Self-Test Questions-2013)
- a) Mutation c) Genetic drift
b) Migration d) Food
- 5) Charles Darwin gave the:
(Self-Test Questions-2013)
- a) Theory of Special creation
b) Theory of Natural selection
c) Inheritance of Acquired characters
d) Cell theory

C h a p t e r ----

25

ECOSYSTEM

1 MCQ

I) From Exercise:-

- The study of relationships of organisms to their environment is known as:
 - Biology
 - Ecology
 - Zoology
 - Morphology
 - Similar group of individuals who can interbreed and produce organisms of their own kind forms a:
 - Population
 - Community
 - Species
 - Succession
 - When living and non-living components interact to produce a stable system in which exchange of material with flow of energy takes place, it forms a/an:
 - Environment
 - Ecosystem
 - Stable Community
 - Ecological
- Succession
- Living organisms can prepare their own food are:
 - Predators
 - Parasites
 - Producers
 - Prey
 - The living organisms which can not prepare their own food but obtain ready-made from others, are:
 - Primary and Secondary Consumers
 - Secondary and Tertiary Consumers
 - Only Primary Consumers
 - Consumers

II) From Punjab Boards:-**LAHORE BOARD**

- The living organisms which can prepare their own food are: (Lahore Board-2008-A)
 - Heterotrophs
 - Green plants
 - Producers
 - Green plants and producers
- The symbiotic relationship in which both partners get benefit is: (Lahore Board-2009-A)
 - Commensalism
 - Mutualism
 - Commensalism and mutualism
 - None of these
- Which is not a micronutrient: (Lahore Board-2010-A)
 - Zinc
 - Iron
 - Sulphur
 - Iodine
- The green plants which capture and bring light energy into ecosystem are: (Lahore Board-2011-A)
 - Scavengers
 - Decomposers
 - Consumers
 - Producers

- Crustaceans with a spiny projection on these planktonic creatures help to keep them from sinking: (Lahore Board-Group-I-2012-A)
 - Porpoise
 - Whale
 - Copepod
 - Bobcat
- Who proposed the term niche: (Lahore Board-Group-II-2012-A)
 - Haeckle
 - Grinnell
 - Linnaeus
 - Lamarck
- The succession in pond is called: (Lahore Board-Group-I-2013-A)
 - Derosere
 - Xerosere
 - Hydrosere
 - Mesosere
- Succession starts on dry soil is called: (Lahore Board-Group-II-2013-A)
 - Hydrosere
 - Xerosere
 - Derosere
 - Desertification
- In 1917 Joseph Grinnell an American Ornithologist first proposed the term: (Lahore Board-Old Scheme-Group-II-2014-A)
 - Ecology
 - Habitat
 - Biome
 - Niche
- Biome is a: (Lahore Board-New Scheme-Group-I-2014-A)
 - Simple community
 - Complex community
 - Regional community
 - Climax community
- Who proposed the term Niche in Ecology: (Lahore Board-New Scheme-Group-II-2014-A)
 - Haeckel
 - Grinnell
 - Etton
 - Darwin

GUJRANWALA BOARD

- The succession in pond is called: (Gujranwala Board-2008-A)
 - Derosere
 - Hydrosere
 - Mesosere
 - None of these
- Who first proposed the term "Niche" in ecology: (Gujranwala Board-2009-A)
 - Haekel
 - Joseph Grinnell
 - Morgan
 - Sutton
- Which is not a micro-nutrient: (Gujranwala Board-2010-A)
 - Scavengers
 - Decomposers
 - Consumers
 - Producers

- a) Zinc b) Iron
c) Sulphur d) Iodine
4) In ecosystem 2nd trophic level is consisted of:
(Gujranwala Board-2011-

A) a) Producers b) Primary consumers

- c) Secondary consumers d) Tertiary consumers
5) A change in the community structure of an ecosystem over a period of time is:
(Gujranwala Board-2012-

A) a) Niche b) Unstable ecosystem
c) Succession d) Pioneer

- 6) Primary succession which starts in a pond ecosystem is termed as:
(Gujranwala Board-2013-

A) a) Ecosphere b) Derosere
c) Hydrosere d) Xerosere

- 7) In 1917, term niche was first proposed by American Ornithologist named:
(Gujranwala Board-New Scheme-2014-

A) a) Charles Eltarf b) Joseph Grinnell
c) Ernst Haeckel d) Lamarck

- 8) In each case, succession is initiated by a few hardy invaders called:
(Gujranwala Board-New Scheme-2015-

A) a) Starters b) Pioneers
c) Climax community d) Decomposers

MULTAN BOARD

- 1) Biosphere is spread out over the surface of planet earth extending about:

(Multan Board-2008-

A) a) 2/4 km b) 4/6 km
c) 6/8 km d) 8/10 km

- 2) Group of interbreeding individuals occurring together in space and time form a:
(Multan Board-2008-

S) a) Species b) Group
c) Population d) Community

- 3) The smallest biological unit that can evolve with time is:
(Multan Board-2009-

A) a) Population b) Community
c) Species d) Ecosystem

- 4) The major regional ecological community of plants and animals form:
(Multan Board-2009-

S) a) Biomass b) Niche
c) Ecosystem d) Biomes

- 5) Which of the following is macronutrient?
(Multan Board-2010-

A) a) Zinc b) Iron
c) Sulphur d) Iodine

- 6) Major regional ecological community of plants and animals form:
(Multan Board-2010-

S) a) Niche b) Biosphere
c) Habitat d) Biome

- 7) The total energy from the Sun is trapped by the producers in ecosystem:
(Multan Board-2011-

A) a) 1 % b) 1.5 %
c) 2 % d) 2 %

- 8) Which one of the following is a foliage lichen?
(Multan Board-2011-

S) a) *Tortula* b) *Dermatocarpen*
c) *Polytrichum* d) *Rhizocarpon*

- 9) Succession ends with a diverse and relatively stable:
(Multan Board-2012-

A) a) Xerosere b) Climax Community

- c) Derosere d) Hydrosere
10) In Xerosere succession, *Polytrichum*, *Tortula* appear during:
(Multan Board-2012-

S) a) Moss stage b) Foliage lichen stage

c) Crustose lichen stage d) Herbaceous stage

- 11) Lichen is a symbiotic association between the fungus and:
(Multan Board-2013-

A) a) Diatom b) An algae
c) Angiosperms d) Gymnosperms

- 12) The relationship of shark with small fish remoras is an example of:
(Multan Board-Old Scheme-2014-

A) a) Grazing b) Commensalism
c) Parasitism d) Predation

- 13) Soil erosion, fire and percolation down through the soil cause loss of:
(Multan Board-New Scheme-2014-

A) a) Sulphates b) Carbonates
c) Nitrates d) Phosphates

- 14) A localized group of species belonging to the same species is called as:
(Multan Board-New Scheme-2015-

A) a) Community b) Population
c) Ecosystem d) Biosphere

BAHAWALPUR BOARD

- 1) All organisms depend for energy ultimately on:
(Bahawalpur Board-2008-

A) a) Photosynthesis b) Catabolism
c) Photogenesis d) Photorespiration

- 2) The living organisms which can prepare their own food are:
(Bahawalpur Board-2009-

A)

- a) Predators b) Parasites
c) **Producers** d) Prey
3) The actual location or place where an organism lives is called its: (Bahawalpur Board-2009-)

- S)
a) Niche b) **Habitat**
c) Biome d) Climate
4) Thin layer of earth in which all life exists is: (Bahawalpur Board-2010-)

- A)
a) **Biosphere** b) Lithosphere
c) Hydrosphere d) Xerosere
5) *Permelia* is an example of: (Bahawalpur Board-2010-)

- S)
a) Crustose lichen b) Mosses
c) **Foliage lichen** d) Herb
6) Who proposed the term Niche in Ecology: (Bahawalpur Board-2011-)

- A)
a) Haeckel b) **Grinnell**
c) Elton d) Cuvier
7) The whole of the world's land is called: (Bahawalpur Board-2012-)

- A)
a) Ecosphere b) **Lithosphere**
c) Biosphere d) Hygrosphere
8) Which one is a Micronutrient: (Bahawalpur Board-2013-)

- A)
a) Phosphorous b) Sulphur
c) **Iron** d) Calcium
9) Disease in living organisms which are caused by parasites are termed as: (Bahawalpur Board-New Scheme-2014-)

- A)
a) Infections b) **Infestations**
c) Parasitism d) Succession
10) Lithosphere includes: (Bahawalpur Board-New Scheme-2015-)

- A)
a) **Earth Soil** b) Air
c) Water d) Gases

FAISALABAD BOARD

- 1) *Dermatocarpon* is an example of: (Faisalabad Board-2008-)

- A)
a) Crustose lichen b) Moss
c) **Foliage lichen** d) Herbaceous

- plant
2) It is a thin layer of earth in which all living organism exists: (Faisalabad Board-2009-)

- A)
a) Biome b) Ozone
c) **Biosphere** d) Habitat

- 3) The living organisms producing their own food: (Faisalabad Board-2010-)

- A)
a) Heterotrophs b) **Consumers**
c) **Green plants** d) Decomposers

- 4) The macronutrient, in biogeochemical cycles, is: (Faisalabad Board-2011-)

A)

- a) Iron b) **Calcium**
c) Zinc d) Iodine
5) All living organisms of the planet earth are collectively called: (Faisalabad Board-2012-)

- A)
a) **Biosphere** b) Lithosphere
c) Hydrosphere d) Atmosphere
6) Who defined the Niche as species occupation? (Faisalabad Board-2013-)

- A)
a) **Charles Eton** b) Charles Lyell
c) Cuvier d) Sutton
7) The whole of the world's land is called: (Faisalabad Board-Old Scheme-2014-)

- A)
a) Ecosphere b) Hygrosphere
c) **Lithosphere** d) Biosphere
8) Diseases in living organisms caused by parasites are called as: (Faisalabad Board-New Scheme-2014-)

- A)
a) **Infestation** b) Endoparasites
c) Disinfestation d) Ectoparasites
9) Diseases in living organisms caused by parasites are called as: (Faisalabad Board-New Scheme-2015-)

- A)
a) Infection b) **Infestation**
c) Parasitism d) Predation

RAWALPINDI BOARD

- 1) An association between the roots of the plants growing in acid soils and certain fungi is called: (Rawalpindi Board-2010-)

- A)
a) Mutualism b) **Mycorrhiza**
c) Lichen d) Succession

- 2) The whole of the world land is called: (Rawalpindi Board-2011-)

- A)
a) **Lithosphere** b) Ecosphere
c) Hygrosphere d) Biosphere

- 3) Over grazing may lead to: (Rawalpindi Board-2012-)

- A)
a) Tundra b) Grassland
c) Taiga d) **Desert**

- 4) Charles Eton defined the niche as the species's: (Rawalpindi Board-2013-)

- A)
a) **Occupation** b) Job
c) Work d) Development

- 5) Moderate grazing is very helpful to maintain ecosystem: (Rawalpindi Board-New Pattern-2014-)

- A)
a) Tundra b) **Grassland**
c) Pond d) Desert

- 6) Study of single population's relationship to environment is called: (Rawalpindi Board-New Pattern-2015-)

- A)
a) **Autecology** b) Synecology
c) Ecology d) Gerantology

SARGODHA BOARD

1) The basic functional unit of ecology is ----- :
(Sargodha Board-2010-

- A) a) Niche b) Population
c) Ecosystem d) Community
- 2) The green photosynthetic plants, which capture and bring light energy into the ecosystem are:
(Sargodha Board-2011-

- A) a) Producers b) Consumers
c) Decomposers d) Scavengers
- 3) The relationship between insects and flowering plants is the example of: (Sargodha Board-2012-

- A) a) Parasitism b) Predation
c) Mutualism d) Commensalism
- 4) Once nitrate enters the plant cell it is reduced as:
(Sargodha Board-2013-

- A) a) Nitrite b) Ammonium
c) Protein d) Carbohydrates

DERA GHAZI KHAN BOARD

1) Major regional ecological community of plants and animals forms: (Dera Ghazi Khan Board-2009-

- A) a) Biosphere b) Habitat
c) Niche d) Biomes
- 2) Total amount of energy production fixed by the plants is productivity:
(Dera Ghazi Khan Board-2010-

- A) a) Primary b) Secondary
c) Gross d) Net
- 3) The actual location of place where an organism lives is called its: (Dera Ghazi Khan Board-2011-

- A) a) Niche b) Environment
c) Habitat d) Ecosystem
- 4) All populations within an ecosystem are known as:

(D.G.K Board-Group-I-2012-

- A) a) Biosphere b) Biome
c) Succession d) Community
- 5) Relationship between Rimoras and Sharks, is an example of: (D.G.K Board-Group-II-2012-

- A) a) Commensalism b) Mutualism
c) Predation d) Parasitism
- 6) They release chemical elements as ions:
(D.G.K Board-Group-II-2013-

- A) a) Producers b) Consumers
c) Decomposers d) Carnivores
- 7) The stage in which the lichens are just like crumpled leaves attached at one point:

(D.G.K Board-New Scheme-Group-I--2014-

- A) a) Moss stage b) Crustose lichen stage
c) Foliage lichen stage d) Shrub stage

8) All the food chains and food webs begin with:
(D.G.K Board-New Scheme-Group-II-2014-

- A) a) Primary consumers b) Secondary consumers
c) Decomposers d) Producers

9) The process in which microorganisms use the proteins and amino acids and release ammonia or ammonium ions is known as:

(D.G.K Board-New Scheme-Group-I-2015-

- A) a) Nitrification b) Ammonification
c) Denitrification d) Assimilation

10) An association between two organisms by which both are benefited is called:

(D.G.K Board-New Scheme-Group-II-2015-

- A) a) Parasitism b) Commensalism
c) Predation d) Mutualism

SAHIWAL BOARD

1) The distinct level or link of food chain are called:
(Sahiwal Board-2013-

- A) a) Food chain b) Food web
c) Trophic levels d) Energy pyramids
- 2) About this much of the total energy from sun is trapped by producers in an ecosystem:
(Sahiwal Board-New Scheme-2014-

- A) a) 1 % b) 2 %
c) 3 % d) 4 %

4) All food chains begin with:
(Sahiwal Board-New Scheme-2015-

- A) a) Producers b) Primary consumers
c) Secondary consumers d) Decomposers

5) The abiotic component of an ecosystem is:
(Sahiwal Board-New Scheme-2015-

- A) a) Temperature b) Producer
c) Consumer d) Decomposer

III) From Entry Test:-

1) Pick the biotic component from the following:
(Entry Test-

- 2007) a) Soil b) Atmosphere
c) Water d) Animals

2) What is the niche of an organism in an ecosystem?

(Entry Test-

- 2012) a) Role played by many organisms in an ecosystem
b) Role played by dead organism in an ecosystem
c) Role played by community of microorganisms in their ecosystem

- d) Role played by an organism in its ecosystem
3) The distinct levels or links of food chain are called:

(Entry Test-

2012)

- a) Trophic level c) Energy pyramid
b) Food web d) Food chain

- 4) Bacteria and fungi are examples of:

(Entry Test-

2012)

- a) Predators c) Consumers
b) Decomposers d) Derivers

- 5) A relationship between two or more organisms of different species in which all partners get benefit is called:

(Entry Test-

2012)

- a) Symbiosis c) Commensalism
b) Parasitism d) Predation

- 6) Populations of different species (plants and animals) living in the same habitat form a:

(Entry Test-

2012)

- a) Community c) Biosphere
b) Ecosystem d) Microhabitat

- 7) A group of inter-breeding individuals occurring together in a space and time is called:

(Self-Test Questions-

2013)

- a) Community c) Niche
b) Population d) Species

- 8) Which of these is biotic factor of the ecosystem:

(Self-Test Questions-

2013)

- a) Air c) Soil
b) Water d) Photosynthetic

plants

- 9) An association between organisms which brings benefit to both organisms is known as:

(Self-Test Questions-

2013)

- a) Predation c) Grazing
b) Commensalism d) Symbiosis

- 10) When a succession is completed, a great diversity of plants and a stable community is seen, which is called:

(Self-Test Questions-

2013)

- a) Hydrosphere c) Climax community
b) Pioneers d) Secondary

succession

- 11) A thin layer of earth in which all living organisms exists is called:

(Self-Test Questions-

2013)

- a) Ecosystem c) Habitat
b) Biosphere d) Xerosere

C h a p t e r ----

26

SOME MAJOR**ECOSYSTEMS****1 MCQ****I) From Exercise:-**

- The soil or terrestrial ecosystems have some adaptations for animals and plants:
 - Supporting tissues
 - Retention of food
 - Temperature
 - Nutrients
- Most plants fit into a few ecosystems which type of plants seem to fit into ecosystem of grass land:
 - Trees
 - Shrubs
 - Perennial herbs
 - Annual weeds
- In which type of ecosystem is the smallest fraction of nutrients present into the soil:
 - Savanna
 - Tundra
 - Grassland
 - Desert
- What biome has the richest soil with nutrients and can be converted into agriculture?
 - Deciduous forest
 - Tropical rain forest
 - Grass land
 - Coniferous forest
- Which of the biomes has been increased in area by human activities?
 - Savannah
 - Grassland
 - Desert
 - Coniferous

II) From Punjab Boards:-**LAHORE BOARD**

- In Sindh the desert ecosystem is called: (Lahore Board-2008-
A)
 - Thar
 - Thal
 - Cholisthan
 - Temperate
- The rate of primary production is about 700-1500 g/m² annually in: (Lahore Board-2009-
A)
 - Temperate grassland
 - Desert
 - Tundra
 - Tropical grassland
- The plants in deserts: (Lahore Board-2010-
A)
 - Remain ever green
 - Short rooted
 - Conserve water
 - Broad leaves
- The zone where enough light penetrates to support the photosynthesis: (Lahore Board-2011-A)
 - Littoral zone
 - Limnetic zone
 - Profundal zone
 - Benthic zone
- A succulent plant has stored water in tissues: (Lahore Board-Group-I-2012-
A)
 - Cacti
 - Moss
 - Yarrow
 - Spruce
- Chilas has major terrestrial ecosystem called: (Lahore Board-Group-II-2012-
A)
 - Deciduous forest
 - Alpine forest
 - Tundra
 - Grassland

7) Drifting or floating microscopic animals and plants are called: (Lahore Board-Group-I-2013-

- A) a) Plankton b) Cyanobacteria
c) Fungi d) Mammals

8) Which one is a plant of a desert: (Lahore Board-Group-II-2013-

- A) a) Pinus b) Dwarf Willow
c) Rose d) Cactus

9) In temperate grassland the rate of primary production is: (Lahore Board-Old Scheme-Group-II-2014-

- A) a) 700 – 1500 g/m² b) 4000 g/m²
c) 1500 – 3000 g/m² d) 6000 g/m²

10) Desert ecosystem of Bhakhar and Mianwali is called: (Lahore Board-New Scheme-Group-I-2014-

- A) a) Thar b) Thal
c) Cholistan d) Rohi

11) Which one is not desert: (Lahore Board-New Scheme-Group-II-2014-

- A) a) Thal b) Thar
c) Sahara d) Taiga

GUJRANWALA BOARD

1) Floating plants are called:

(Gujranwala Board-2008-

- A) a) Protista b) Fungi
c) Plankton d) Algae

2) The scientific name for rhesus monkey is: (Gujranwala Board-2009-

- A) a) *Macaca mullata* b) *Taxus baccata*
c) *Felis felis* d) None of these

3) The plants in deserts: (Gujranwala Board-2010-

- A) a) Remain ever green b) Short rooted
c) Conserve water d) Broad leaves

4) Limnetic phytoplanktons include the: (Gujranwala Board-2011-

- A) a) Bacteria b) Algae
c) Mosses d) Cyanobacteria

5) In Sindh, the desert ecosystem is called: (Gujranwala Board-2012-

- A) a) Thal b) Sahara
c) Thar d) Cholistan

6) Coniferous forests of high altitude are called: (Gujranwala Board-2013-

- A) a) Alpine b) Arctic
c) Boreal d) Tundra

7) Northern coniferous forests are also called:

(Gujranwala Board-New Scheme-2014-

- A) a) Savanna b) Prairies
c) Taiga d) Tundra

8) Temperate deciduous forests are located in Pakistan at ----- :

(Gujranwala Board-New Scheme-2015-

- A) a) Shogran b) Chilas
c) Mianwali d) Sindh

MULTAN BOARD

1) Productivity of aquatic ecosystem is basically determined by: (Multan Board-2008-

- A) a) Light b) Nutrients
c) Temperature d) Both a and b

2) Which of the following biome is the most fragile? (Multan Board-2008-

- S) a) Tundra b) Desert
c) Grassland d) Forest

3) The average annual rainfall in Temperate Deciduous Forests is about: (Multan Board-2009-

- S) a) 1500—2000 mm b) 250 —500 mm
c) 750—1500 mm d) 250—750 mm

4) Roots in plants and skeleton in animals support them on land against the force of:

(Multan Board-2010-

- A) a) Attraction b) Gravity
c) Adhesion d) Cohesion

5) Coniferous forests located at high altitude are called: (Multan Board-2010-

- S) a) Boreal b) Arctic
c) Alpine d) Tundra

6) What will be the age of Willow Tree, 10 centimeter

and 7 centimeter in diameter?

(Multan Board-2011-

- A) a) 40 years b) 50 years
c) 60 years d) 70 years

7) The grasslands of tropical climates have woody trees and are called: (Multan Board-2011-

- S) a) Prairies b) Boreals
c) Savanna d) Tundra

8) The rate of primary productivity is about 700—1500 g/m³ in: (Multan Board-2012-

- A) a) Desert b) Tundra
c) Tropical grassland d) Temperate grassland

9) Decomposers and detritus feeders are only living organisms in: (Multan Board-2012-

- S) a) Littoral zone b) Limnetic zone
c) Profundal zone d) Atmospheric zone

10) Desert Ecosystem occurs in region where annual

rainfall is less than: (Multan Board-2013-

- A) a) 25—50 cm b) 5—10 cm
c) 15—20 cm d) 250—270 cm

11) Coniferous forests located at high latitude are called: (Multan Board-Old Scheme-2014-

- A) a) Taiga b) Alpine
c) Boreal d) Prairies

12) Coniferous forests located at high altitude are called: (Multan Board-New Scheme-2014-

- A) a) Boreal b) Alpine
c) Arctic d) Tundra

13) The biome which has been increased in area by human activities:

(Multan Board-New Scheme-2015-

- A) a) Grassland b) Tundra
c) Desert d) Coniferous forests

BAHAWALPUR BOARD

1) The productivity of aquatic ecosystem is basically

determined by: (Bahawalpur Board-2009-

- A) a) Light and Nutrients b) Light and air
c) Light and Mud d) Light and soil

2) The tall grass is: (Bahawalpur Board-2009-

- S) a) *Andropogon* b) *Panicum*
c) *Stipa* d) Both a and b

3) Which biome has been increased in area by human

activities: (Bahawalpur Board-2010-

- A) a) Tundra b) Grassland
c) Desert d) Alpine forest

4) The dominant species in the grass land ecosystem are: (Bahawalpur Board-2010-

- S) a) Graminoids b) Shrubs
c) Trees d) Mosses

5) Which one is not Desert:

(Bahawalpur Board-2011-

- A) a) Thal b) Sahara
c) Thar d) Taiga

6) Limnetic Phytoplankton includes the:

(Bahawalpur Board-2012-

- A) a) Bacteria b) Algae
c) Mosses d) Cyanobacteria

7) Which of the following is found in profundal zone:

(Bahawalpur Board-2013-

- A) a) Snails b) Insect larvae
c) Bacteria d) All these

8) Grasslands have no woody plants are also known as: (Bahawalpur Board-New Scheme-2014-

- A) a) Prairies b) Savanna
c) Alpine d) Boreal

9) Here light is insufficient to support photosynthesis:

(Bahawalpur Board-New Scheme-2015-

- A) a) Littoral zone b) Limnetic zone
c) Profundal zone d) Phytoplankton zone

FAISALABAD BOARD

1) Deepest zone of freshwater lakes is known as:

(Faisalabad Board-2008-

- A) a) Benthic zone b) Profundal zone
c) Limnetic zone d) Littoral zone

2) Cacti and Euphorbia are desert plants which store

water in their: (Faisalabad Board-2008-

- A) a) Roots b) Stem
c) Bud d) Leaves

3) The biome is increased in area by human activity?

(Faisalabad Board-2009-

- A) a) Grass land b) Forest
c) Desert d) Savanna

4) Nutrients tend to be concentrated near the bottom

sediments: (Faisalabad Board-2010-

- A) a) Desert b) Tundra
c) Aquatic ecosystem d) Coniferous

forests

5) In Pakistan, the desert ecosystem of Western Punjab is:

(Faisalabad Board-2011-

- A) a) Cholistan b) Rajasthan
c) Thar d) Thal

6) The light in this zone is insufficient to support photosynthesis:

(Faisalabad Board-2013-

- A) a) Limnetic b) Profundal
c) Littoral d) All of these

7) Limnetic phytoplankton includes the:

(Faisalabad Board-Old Scheme-2014-

- A) a) Algae b) Bacteria
c) Cyanobacteria d) Mosses

8) Which biome has been increased in area by human

activities: (Faisalabad Board-New Scheme-2014-

- A) a) Grass land b) Savanna
c) Coniferous d) Desert

9) Coniferous forests located at latitude are called:

(Faisalabad Board-New Scheme-2015-

- A) a) Deciduous b) Alpine
c) Boreal d) Woodland

RAWALPINDI BOARD

1) The rain fall in desert Ecosystem is:

(Rawalpindi Board-2010-

- A)

- a) Less than 25 to 50 cm
b) From 50 cm to 75 cm
c) From 100 cm to 200 cm
d) From 250 to 750 mm or not at all
- 2) The coniferous forests located at high altitude are called: (Rawalpindi Board-2011-)
- A) a) Boreal b) Alpine
c) Temperate d) Desert
- 3) Layering is a characteristic of: (Rawalpindi Board-2012-)
- A) a) Tundra b) Grassland
c) Taiga d) Desert
- 3) In Sindh, the desert ecosystem is called: (Rawalpindi Board (A) 2013)
- a) Thal b) Thar
c) Sahara d) Ghobi
- 4) The biome, which has very fertile soil, rich in organic matter with maximum water holding capacity is: (Rawalpindi Board –New Pattern-2014-)
- A) a) Alpine forest
b) Temperate deciduous forest
c) Grassland
d) Desert
- 5) Which of the following has been increased in area by human activities: (Rawalpindi Board–New Pattern-2015-)
- A) a) Savanna b) Grassland
c) Coniferous d) Desert

SARGODHA BOARD

- 1) Sahara desert is found in: (Sargodha Board-2010-)
- A) a) Asia b) America
c) Africa d) Europe
- 2) Which biome has the richest soil with nutrients and can be converted into the ecosystem: (Sargodha Board-2011-)
- A) a) Temperate deciduous forest
b) Tropical rain forest
c) Desert
d) Coniferous forest
- 3) Coniferous forests located at high altitude are: (Sargodha Board-2012-)
- A) a) Alpine b) Boreal
c) Taiga d) Arctic
- 4) Phyto-planktons are: (Sargodha Board-2013-)
- A) a) Drifting plants b) Rooted plants
c) Fixed plants d) Submerged plants

DERA GHAZI KHAN BOARD

- 1) Coniferous forests of high altitude are known as: (Dera Ghazi Khan Board-2009-)
- A) a) Boreal b) Alpine
c) Arctic d) Tundra
- 2) *Andropogon, Stipa and Panicum* are found in ecosystem: (Dera Ghazi Khan Board-2010-)
- A) a) Desert b) Tundra
c) Grassland d) Coniferous boreal forests
- 3) The average rain fall in temperate deciduous forest is between: (Dera Ghazi Khan Board-2011-)
- A) a) 600—1500 mm b) 650—1500 mm
c) 700—1500 mm d) 750—1500 mm
- 4) Which one is the most fragile ecosystem? (D.G.K Board-Group-I-2012-)
- A) a) Grass land b) Woodland
c) Tundra d) Savanna
- 5) Most fragile all biomes, is: (D.G.K Board-Group-II-2012-)
- A) a) Grassland b) Desert
c) Tundra d) Forest
- 6) Most fragile of all biomes is: (D.G.K Board-Group-I-2013-)
- A) a) Grassland b) Forest
c) Desert d) Tundra
- 7) Average rainfall in Desert Ecosystem is: (Dera Ghazi Khan Board Group II 2013)
- a) 10—20 inches b) 30—40 inches
c) 50—60 inches d) 70—80 inches
- 8) Perhaps the most fragile of all the Biomes, because of its short growing season is: (D.G.K Board-New Scheme-Group-I-2014-)
- A) a) Tundra b) Desert
c) Grassland d) Temperate Deciduous Forests
- 9) The zone, rich in life, in a freshwater lake is called: (D.G.K Board-New Scheme-Group-II-2014-)
- A) a) Littoral zone b) Limnetic zone
c) Profundal zone d) Desert
- 10) Ecosystem present on Land or Soil is called: (D.G.K Board-New Scheme-Group-I-2015-)
- A) a) Terrestrial b) Atmosphere
c) Lithosphere d) Both a and c
- 11) Northern coniferous forests are called: (D.G.K Board-New Scheme-Group-II-2015-)
- A) a) Alpine b) Boreal
c) Taiga d) Prairies

SAHIWAL BOARD

1) Layering is the characteristics feature of which ecosystem: (Sahiwal Board-2013-

- A) a) Grassland b) Forest
c) Desert d) Boreal and alpine forest

2) Which of the following is drifting animal: (Sahiwal Board-New Scheme-2014-

- A) a) Insect larva b) Protozoa
c) Turtle d) Snake

3) Which of the following is the most fragile ecosystem? (Sahiwal Board-New Scheme-2015-

- A) a) Grassland b) Wood land
c) Savanna d) Tundra

III) From Entry Test:-

1) In ----- zone, light is insufficient to support photosynthesis: (Entry Test-

- 2007) a) Desert b) Littoral
c) Profundal d) All of these

C h a p t e r ---
27

MAN AND HIS ENVIRONMENT

1 MCQ

I) From Exercise:-

1) Which of the country has the highest rate of human population?

- a) Australia b) Africa
c) Asia d) North America

2) If population is above the carrying capacity what must happen:

- a) It must immediately cure.
b) It can remain stable indefinitely.
c) It can continue to increase.
d) It must eventually decline.

3) What is our principal source of energy?

- a) Nuclear energy b) Geothermal energy
c) Solar energy d) Tidal energy

4) Batteries store which type of energy:

- a) Electrical b) Mechanical
c) Chemical d) Nuclear

II) From Punjab Boards:-**LAHORE BOARD**

1) A single chlorine atom can react with ultraviolet rays and destroy ozone molecules as many as:

- (Lahore Board-2008-
A) a) One billion b) One million
c) Two million d) Two billion

2) The largest consumers of electrical energy are: (Lahore Board-2009-

- A) a) Homes b) Offices
c) Agriculture d) Industries

3) The percentage of land under cultivation is: (Lahore Board-2010-

- A) a) 30 % b) 21 %
c) 11 % d) 5 %

4) Ozone molecule is made up of binding of three atoms of: (Lahore Board-2011-

- A) a) Carbon b) Hydrogen
c) Nitrogen d) Oxygen

5) It is not a fossilized fuel: (Lahore Board-Group-I-2012-

- A) a) Lignite b) Peat
c) Natural gas d) Oil

6) Which one destroys ozone molecule in ozone layer:

(Lahore Board-Group-II-2012-

- A) a) Sulphur b) Lead
c) Carbon monoxide d) Chlorine

7) Stone monuments are being eroded due to stone cancer by: (Lahore Board-Group-I-2013-

- A) a) Green house effect b) Acid rain
c) Ozone depletion d) Global warming

8) Disease caused by nutritional deficiency in man: (Lahore Board-Group-II-2013-

- A) a) Cholera b) Beriberi
c) Arthritis d) Sugar

9) The total area of the world under cultivation is: (Lahore Board-Old Scheme-Group-II-2014-

- A) a) 30 % b) 21 %
c) 11 % d) 1 %

10) Air in motion is called: (Lahore Board-New Scheme-Group-I-2014-

- A) a) Atmosphere b) Wind
c) Gas d) Weather

11) Metal illness causes: (Lahore Board-New Scheme-Group-II-2014-

- A) a) Goiter b) Anemia
c) Alzheimer d) Scurvy

GUJRANWALA BOARD

1) Ozone is present up to height of: (Gujranwala Board-2008-

- A) a) 10—50 km b) 100 km
c) 90 km d) 110 km

2) Modern man is called *Homo sapiens* and has been on this earth for about ----- year:
(Gujranwala Board-2009-

- A)
a) 10000 b) 20000
c) 30000 d) 40000

3) The percentage of land under cultivation is:
(Gujranwala Board-2010-

- A)
a) 30 % b) 21 %
c) 11 % d) 5 %

4) Only 30 % of Earth is:
(Gujranwala Board-2011-

- A)
a) Land b) Freshwater
c) Marine water d) Mountains

5) Stone monuments like 'Taj Mahal' are being eroded due to 'stone cancer' by:
(Gujranwala Board-2012-

- A)
a) Acid rain b) Green house effect
c) Eutrophication d) Radiation

6) The ozone layer has developed a hole over the:
(Gujranwala Board-2013-

- A)
a) Arctica b) Equator
c) Antarctica d) Tropics

7) In human mental illness disease is due to:
(Gujranwala Board-New Scheme-2014-

- A)
a) Alzheimer b) Kwashiorkor
c) Diphtheria d) Hemophilia

8) The steady and internal state of homeostasis is known as:
(Gujranwala Board-New Scheme-2015-

- A)
a) Disorder b) Disease
c) Normal health d) Abnormal health

MULTAN BOARD

1) In ocean, temperature at the depth of few hundred meters is only:
(Multan Board-2008-

- A)
a) 5 °C b) 15 °C
c) 25 °C d) 35 °C

2) All are infectious diseases except:
(Multan Board-2008-

- S)
a) Alzheimer b) Cholera
c) Tuberculosis d) AIDS

3) A chemical which kills the weeds in a crop is known as:
(Multan Board-2009-

- A)
a) Insecticide b) Pesticide
c) Germicide d) Herbicide

4) At the time of Independence at 1947, the population of Pakistan was about:
(Multan Board-2009-

- S)
a) 32.5 billion b) 150 million
c) 160 million d) 32.5 million

5) The population of Pakistan in 1947 was:
(Multan Board-2010-

- A)
a) 28.2 Million b) 30.2 Million
c) 32.2 Million d) 34.2 Million

6) How much area of the world is under cultivation?
(Multan Board-2010-

- S)
a) 15 % b) 11 %
c) 25 % d) 21 %

7) An infectious disease which can be transmitted to others is:
(Multan Board-2011-

- A)
a) Beri-Beri b) Anemia
c) Diphtheria d) Goiter

8) Air is being polluted rapidly due to industrialization and:
(Multan Board-2011-

- S)
a) Urbanization b) Pollution
c) Deforestation d) Automobiles

9) As Chlorofluoro carbons rise to the atmosphere, the ultraviolet rays release:
(Multan Board-2012-

- A)
a) Flourine b) Chlorine
c) Carbon d) Hydrogen

10) Which one of the following is responsible for headache, brain damage and death:
(Multan Board-2012-

- S)
a) Oxides of nitrogen b) Lead compounds
c) CFCs d) Carbon monoxide

11) The cheapest source of Energy is:
(Multan Board-2013-

- A)
a) Fossil Fuels b) Geothermal Energy
c) Hydroelectric Power d) Nuclear Energy

12) A pesticide is a chemical which destroys:
(Multan Board-Old Scheme-2014-

- A)
a) Insects b) Pests
c) Fungi d) Weeds

13) Total area of the world under cultivation is:
(Multan Board-New Scheme-2014-

- A)
a) 9 % b) 10 %
c) 11 % d) 12 %

14) Establishment of new forests, where no forests existed before:
(Multan Board-New Scheme-2015-

- A)
a) Deforestation b) Desertification
c) Reforestation d) Afforestation

BAHAWALPUR BOARD

1) In pure form Ozone is explosive highly poisonous gas having color:
(Bahawalpur Board-2008-

- A)
a) Red b) Orange
c) Bluish d) Yellow

2) The study of human populations and things that effect them is known as:

(Bahawalpur Board-2009-

- A) a) Biology b) Demography
c) Physiogy d) Ecology

3) Ozone is present up to the height of:

(Bahawalpur Board-2009-

- S) a) 10–110 km b) 10–90 km
c) 10–60 km d) 10–50 km

4) Industrial wastes are: (Bahawalpur Board-2010-

- A) a) Herbicides b) Fungicides
c) Insecticides d) Effluents

5) The steady internal state of homeostasis is known as:

(Bahawalpur Board-2010-

- A) a) Disease b) Tumor
c) Normal health d) Depression

6) A single chlorine atom can react with ultraviolet rays and destroy ozone molecules:

(Bahawalpur Board (S)

- 2010) a) 1.5 million b) 1 million
c) 2 million d) 2.5 million

7) Mental illness causes the:

(Bahawalpur Board-2011-

- A) a) Goiter b) Anemia
c) Alzheimer d) Scurvy

8) Availability of Fresh Water is:

(Bahawalpur Board-2013-

- A) a) 90 % b) 70 %
c) 11 % d) 1 %

9) About 95 % of our daily energy requirements are

filled by: (Bahawalpur Board-New Scheme-2014-

- A) a) Nuclear energy b) Hydroelectric power
c) Geothermal energy d) Fossil fuels

10) Water present in the form of Frozen Ice Caps is:

(Bahawalpur Board-New Scheme-2015-

- A) a) 1 % b) 2 %
c) 3 % d) 4 %

FAISALABAD BOARD

1) What substance destroys ozone layer?

(Faisalabad Board-2008-

- A) a) Hydrogen b) Carbon
c) Chlorine d) Sulphur

2) The air pollutant oxides of nitrogen result from:

(Faisalabad Board-2010-

- A) a) Combustion of leaded petrol
b) Cigarette smoke
c) Air conditioning system
d) Burning of fossil fuel

3) The percentage of freshwater in lakes, streams and rivers is:

(Faisalabad Board-2011-

A)

- a) 1 % b) 2 %
c) 3 % d) 11 %

4) An unusual type of pollution is:

(Faisalabad Board-2012-

A)

- a) Water pollution b) Soil pollution
c) Noise pollution d) Radiation pollution

5) Earth surface is occupied by the marine water ecosystem:

(Faisalabad Board-2012-

A)

- a) 70 % b) 75 %
c) 80 % d) 85 %

6) The earth surface is covered with water about:

(Faisalabad Board-2013-

A)

- a) 50 % b) 60 %
c) 70 % d) 80 %

7) In dams, the power used to drive generators to produce electricity is called:

(Faisalabad Board-2013-

A)

- a) Wind power b) Nuclear power
c) Hydroelectric power d) Tidal power

8) Land occupies only -----part of the earth:

(Faisalabad Board-Old Scheme-2014-

A)

- a) 30 % b) 50 %
c) 70 % d) 90 %

9) At the time of independence, the population of Pakistan was about:

(Faisalabad Board-New Scheme-2014-

A)

- a) 32.5 billion b) 32.5 million
c) 150 million d) 160 million

10) The most widely used source of energy on earth is:

(Faisalabad Board-New Scheme-2015-

A)

- a) Wind b) Sun
c) Water d) Geothermal

RAWALPINDI BOARD

1) A single chlorine atom can react with ultra violet rays and destroy ozone molecule as many as:

(Rawalpindi Board-2010-

A)

- a) 1 million b) 1 billion
c) 5 million d) 2 million

2) The decline in thickness of ozone layer is caused by

increasing level of: (Rawalpindi Board-2011-

A)

- a) Hydrocarbons b) Nitrocarbons
c) Chloroflouro carbons d) Floro carbons

3) The upper layer of earth crust is:

(Rawalpindi Board-2012-

A)

- a) Rock b) Sand
c) Soil d) Clay

4) Ozone molecule is made up by building of three

atoms of: (Rawalpindi Board-2013-

- A) a) Nitrogen b) Hydrogen
c) Oxygen d) Carbon
- 5) As CFCs rise to the atmosphere, the ultraviolet release: (Rawalpindi Board-New Pattern-2014-
- A) a) Flourine b) Chlorine
c) Carbon d) Oxygen
- 6) Which of the following is renewable resource: (Rawalpindi Board-New Pattern-2015-
- A) a) Coal b) Land
c) Petroleum d) Natural gas

SARGODHA BOARD

- 1) Which one is congenital disease? (Sargodha Board-2010-
- A) a) Hemophilia b) Malaria
c) Scurvy d) AIDS
- 2) As CFCs rise to the atmosphere, ultraviolet rays release: (Sargodha Board-2011-
- A) a) Flourine b) Chlorine
c) Carbon d) Hydrogen
- 3) A chemical that kills weed in a crop is called: (Sargodha Board-2012-
- A) a) Pesticide b) Insecticide
c) Fungicide d) Herbicide
- 4) What is not true about ozone? (Sargodha Board-2013-
- A) a) It filters most of UV rays.
b) It protects us from UV rays.
c) It contains ozone.
d) It extends from 8—9 kilometers above earth.

DERA GHAZI KHAN BOARD

- 1) Non renewable resources includes various metal ions, non metallic minerals and: (Dera Ghazi Khan Board-2009-
- A) a) Oil b) Petrol
c) Coal d) Fossil fuels
- 2) Oxides of nitrogen cause: (Dera Ghazi Khan Board-2010-
- A) a) Brain damage b) Cough
c) Death d) Lung cancer
- 3) Agrochemicals used in agriculture are commonly called pesticides which include: ▲ (Dera Ghazi Khan Board-2011-
- A) a) Insecticides and fungicides
b) Fungicides and herbicides
c) Insecticides, fungicides and herbicides

d) Insecticides only

- 4) The chemical, which destroys agricultural pests or competitors is called:

(D.G.K Board-Group-I-2012-

- A) a) Bio pesticide b) Germicide
c) Herbicide d) Pesticide
- 5) Upper layer of earth's crust is: (D.G.K Board-Group-II-2012-
- A) a) Dust b) Sand
d) Soil erosion d) Soil
- 6) Largest consumer of electricity: (D.G.K Board-Group-I-2013-

- A) a) Air conditioners b) Industry
c) Refrigerator d) Computers

- 7) Which one of the following is a renewable resource: (D.G.K Board-Group-I-2013-

- A) a) Peat b) Air
c) Natural gas d) Oil
- 8) The upper layer of earth's crust is called: (D.G.K Board-Group-II-2013-

- A) a) Ecology b) Topography
c) Soil d) Synecology
- 9) The befouling of the air by anything that may be harmful to living organisms is: (D.G.K Board-New Scheme-Group-I--2014-

- A) a) Water pollution b) Soil pollution
c) Air pollution d) Noise pollution

- 10) Which of the following acts as environmental buffer: (D.G.K Board-New Scheme-Group-II-2014-

- A) a) Deserts b) Oceans
c) Forests d) Lakes
- 11) Establishment of new forests where no forests existed previously is called: (D.G.K Board-New Scheme-Group-I-2015-

- A) a) A-forestation b) Reforestation
c) Deforestation d) Forestation

- 12) A chemical which kills weed plants is called: (D.G.K Board-New Scheme-Group-II-2015-

- A) a) Pesticide b) Insecticide
c) Fungicide d) Herbicide

SAHIWAL BOARD

- 1) The upper weathered layer of earth crust is: (Sahiwal Board-2013-

- A) a) Rock b) Soil
c) Sandy d) Rhizome

- 2) Environmental buffers are: (Sahiwal Board-New Scheme-2014-

- A) a) Wild animals b) Abiotic factors

- c) Forest d) Clouds
3) Which of the following act as environmental buffer? (Sahiwal Board-New Scheme-2015-)

- A)
a) Deserts b) Forests
c) Oceans d) Lakes

III) From Entry Test:-

- 1) The cause of acid rain is: (Entry Test-2012)

- a) Oxides of carbon
b) Oxides of nitrogen and sulphur
c) Oxides of sulphur
d) Oxides of nitrogen

Syllabus For Entrance Test

2015

Total 88

MCQs

1. INTRODUCTION TO BIOLOGY: 4

MCQs

Content:

Branches of Biology

Learning outcomes:

Define following terms:

Transgenic plants, Cloning, Pasteurization,

Preventive measure, Vaccination, Drug therapy

Prescribed Chapter For Study:

Chapter No: 1 (First Year Biology)

2. CELL BIOLOGY: 10

MCQs

Content:

Cell structure

Structure and Function of Cellular Organelles

Cell Division

Learning outcomes:

- a. Compare the structure of typical animal and plant cell
b. Compare and contrast the structure of Prokaryotic cell with Eukaryotic cells
c. Fluid mosaic model of cell membrane and transportation (diffusion, facilitated diffusion, active and passive transport), endocytosis and exocytosis.
d. Outline the structure and function of following organelles:
Nucleus, Endoplasmic reticulum, Golgi Apparatus, Mitochondria, Centrioles, Ribosomes
e. Describe Meiotic errors (Down's syndrome, Klinefelter's syndrome, Turner's syndrome)

Prescribed Chapters for Study:

Chapter No: 4 (First Year Biology)

Chapter No: 21 (Second Year Biology)

3. BIOLOGIC MOLECULES: 9

MCQs

Content:

Carbohydrates 2

MCQs Proteins 1

MCQ Lipids 1

MCQ Nucleic Acids (DNA & RNA) 1

MCQ Enzymes 4

MCQs

Learning outcomes:

- a. Discuss carbohydrates, Monosaccharides (Glucose), Oligosaccharides (Cane sugar, sucrose) Polysaccharides (Starches)
b. Describe Proteins: Amino acids, structure of proteins
c. Describe Lipids: Waxes, Phospholipids, Terpenoids
d. Describe the structure along its backbone composition and function of DNA as hereditary material, Replication of DNA (Semi-conservative), Role of triplet codons, Transcription (Making up of mRNA), Translation (Protein synthesis): role of ribosomes, mRNA, tRNA
e. Give the structure and types of RNA (mRNA, rRNA, tRNA)
f. What is enzyme and its role in reducing activation energy?
g. Define the following terms:
Enzymes, Coenzyme, Co-factor, Prosthetic group, Apoenzyme and Holoenzyme
h. Explain the model/mechanism of enzyme action.
i. Describe the effects of temperature, pH, enzyme concentration and substrate concentration on the rate of enzyme catalyzed reaction
j. Explain the effects of reversible and irreversible, competitive and non-competitive inhibitors on the rate of enzyme activity

Prescribed Chapters For Study:

Chapter No: 2 (First Year)

Chapter No: 3 (First Year)

Chapter No: 20 (Second Year)

4. MICROBIOLOGY: 4

MCQs

Content:

Virus 1

MCQ Bacteria 2

MCQs Fungi 1

MCQ

Learning outcomes:

- a. Which are the viral diseases in human?
b. Retroviruses and Acquired Immunodeficiency diseases

- c. Describe the Life cycle of Bacteriophage (in detail with its all steps) including:
 - i. Lytic cycle
 - ii. Lysogenic cycle
- d. Describe the structure and types bacteria
- e. Discuss in detail:
 - i. Gram +ve bacteria
 - ii. Gram –ve bacteria
 - iii. Nutrition in bacteria
- f. What are the uses and misuses of antibiotics
- g. What are molds (fungi)? How they are useful and harmful to mankind, give examples.
- h. Describe the life cycle of fungus (Rhizopus).

Prescribed Chapters For Study:**Chapter No: 5 (First Year Biology)****Chapter No: 6 (First Year Biology)****Chapter No: 8 (First Year Biology)****5. KINGDOM ANIMALIA: 5 MCQs****Content:**

Kingdom Animalia (Phyla)

Learning outcomes:

- a. Porifera (With respect to their capacity to regenerate)
- b. Coelenterata (Coral reefs as habitat for sea animals)
- c. Platyhelminthes (Infection in humans) with examples
- d. Arthropods (Economic importance of Arthropods and harmful impacts on Man)
- e. Define the following terms:
 - i. Coelomata
 - ii. Acoelomata
 - iii. Pseudocoelomata
 - iv. Radiata
 - v. Bilateria
- vi. Diploblastic and Triploblastic organization

Prescribed Chapter For Study:**Chapter No: 10 (First Year Biology)****6. HUMAN PHYSIOLOGY: 36 MCQs****Content:**

- a. Digestive System 4 MCQs
- b. Gas exchange and Transportation 4 MCQs
- c. Excretion and Osmoregulation 5 MCQs
- d. Nervous System 4 MCQs
- e. Reproduction 5 MCQs
- f. Support and Movement 5 MCQs
- g. Hormonal Control (Endocrine glands) 4 MCQs
- h. Immunity 5 MCQs

Learning outcomes:**a. Digestive System:****Prescribed Chapter For Study:****Chapter No: 12 (First Year Biology)**

Anatomy of digestive system and specify the digestion in:

- i. Oral cavity (role of saliva and enzymes)
- ii. Stomach (enzymes)
- iii. Small intestine
- iv. Large intestine

b. Gas Exchange and Transportation:**Prescribed Chapters For Study:****Chapter No: 13 (First Year Biology)****Chapter No: 14 (A part) (First Year Biology)**

- i. Anatomy of respiratory system (nostrils, trachea, lungs)
- ii. Explain the term breathing
- iii. Lymph, structure of heart, carriage of oxygen and carbon dioxide

c. Excretion and Osmoregulation:**Prescribed Chapter For Study:****Chapter No: 15 (Second Year)**

- i. Describe the structure of kidney and its functions with respect to homeostasis
- ii. What are kidney problems and cures? Kidney stones, lithotripsy, kidney transplant, dialysis and renal failure
- iii. What do you understand by term Homeostasis?

d. Nervous System:**Prescribed Chapter For Study:****Chapter No: 17 (A part) (Second Year Biology)**

- i. What is Nervous system and its types?
- ii. Explain CNS (Central Nervous System) including fore brain, mid brain, hind brain and spinal cord
- iii. Explain PNS (Peripheral Nervous System) and its types (Autonomic and Sympathetic Nervous System)
- iv. Neurons (Associative, motor and sensory neurons)
- v. Discuss the Nervous disorders (Parkinson's disease, Epilepsy and Alzheimer's disease)
- vi. What do you understand by Biological clock and circadian Rhythms?

e. Reproduction:**Prescribed Chapter For Study:****Chapter No: 18 (Second Year Biology)**

- i. Explain the reproductive system in male in detail
- ii. Explain the Reproductive system in female / Menstrual cycle
- iii. Explain:
 - Spermatogenesis
 - Oogenesis
- iv. Discuss the following Diseases in detail which are sexually transmitted: Gonorrhea, Syphilis, and how these diseases can be controlled (treatment is not required)

f. Support and Movement:**Prescribed Chapter For Study:****Chapter No: 16 (Second Year Biology)**

- i. Explain the role of Human skeleton and skeletal muscles in locomotion
- ii. Explain the process of muscle contraction
- iii. What is Muscle fatigue, Tetany, Cramps?
- iv. Describe the structure and functions of involuntary, voluntary and cardiac muscles.

g. Hormonal control (Endocrine glands):
Prescribed Chapter For Study:

Chapter No: 17 (A part) (Second Year Biology)

- i. What are hormones?
- ii. Describe Hypothalamus with its hormones
- iii. Describe Pituitary gland and hormones secreted from
 - its Anterior, Median and Posterior lobe
- iv. Describe adrenal glands with its hormones.
- v. What are Islets of Langerhans?
- vi. What are the hormones of alimentary canal (Gastrin, secretin)?
- v. The hormones of ovaries and testes

h. Immunity:

Prescribed Chapters For Study:

Chapter No: 14 (Last part) (First Year Biology)

Chapter Nos: 1 and 6 (Vaccination Topic) (First Year Biology)

- i. Immune system and define its components: Antigen, Antibody (structure of antibody), Lymphocytes (B and T cells)
- ii. What is cell mediated response and humoral immune response?
- iii. Types of Immunity: Active immunity, Passive immunity
- iv. What do you mean by vaccination?

7. BIOENERGETICS: 5

MCQs

Content:

Photosynthesis and cellular respiration

Learning outcomes:

- a. Photosynthetic pigments and other absorption spectrum
- b. Light dependent stage
- c. Light independent stage
- d. Describe the respiration at cellular level including: Glycolysis, Krebs' cycle, Electron Transport Chain

Prescribed Chapters For Study:

Chapter No: 11 (First Year Biology)

8. BIOTECHNOLOGY: 5

MCQs

Content:

DNA technology

Learning outcomes:

- a. Explain Recombinant DNA Technology
- b. Discuss Polymerase Chain Reaction (detailed procedure)
- c. What do you understand by the following terms: Gene therapy, Transgenic animals

Prescribed Chapters For Study:

Chapter No: 23 (Second Year Biology)

8. ECOSYSTEM: 5

MCQs

Contents:

Components of Ecosystem

Biological succession

Energy flow in ecosystem

Impacts of Human activity on ecosystem

Learning outcomes:

- a. What is succession, give various stages of succession on land.
- b. What is the significance of Human activity on ecosystem as population, deforestation, ozone depletion, Green house effect.

Prescribed Chapters For Study:

Chapter No: 25 (Second Year Biology)

Chapter No: 26 (A part) (Second Year Biology)

Chapter No: 27 (A part) (Second Year Biology)

10. EVOLUTION AND GENETICS: 5

MCQs

Content:

Darwin's theory

Lamarck theory

Evidences of evolution

Genetics

Learning outcomes:

- a. Theory Darwin and Lamarck, also discuss the merits and demerits
- b. Evidences of evolution from paleontology
- c. Sex determination and sex linkage in humans
- d. Define the following terms: Mutations, Epistasis, Gene, Allele, Multiple allele.

Prescribed Chapters For Study:

Chapter No: 22 (Second Year Biology)

Chapter No: 24 (Second Year Biology)

SECTION (II)

SHORT QUESTIONS

Chapter No: 15 ----- 3SQs

Chapter No: 16 ----- 3SQs

Chapter No: 17 ----- 3SQs

Chapter No: 18 ----- 3SQs

Chapter No: 19 ----- 2SQ

Chapter No: 20 ----- 3SQs

Chapter No: 21 ----- 2SQs

Chapter No: 22 ----- 3SQs

Chapter No: 23 ----- 2SQs

Chapter No: 24 ----- 3SQs

Chapter No: 25 ----- 3SQs

Chapter No: 26 ----- 2SQs

Chapter No: 27 ----- 2SQs

C h a p t e r -----

15

HOMEOSTASIS

3 SQs

From Exercise:-**Questions**

1. Differentiate between Osmoconformers and Osmoregulators.
2. Define Anhydrobiosis with an example.
3. Why does filtration take place only at glomeruli part of nephron and nowhere else?
4. Mention two metabolic altered states that generally (70 %) cause kidney stone formation.
5. What is a Renal Failure?
6. Account one each main adaptation in plants to high And low temperatures.

Answers**1. Differences between Osmoconformers and Osmoregulators:-**

Osmoconformers	Osmoregulators
1. The osmotic concentration of their body fluids are equal or isotonic to their surroundings.	1. Their body fluid concentrations differ noticeably the outside environment.
2. They do not require actively to adjust their internal osmotic state.	2. They actively regulate to discharge excess water in hypotonic and excrete salts in hypertonic environment.
3. Most marine invertebrates are osmoconformers. Among vertebrates hagfishes are osmoconformers. Marine cartilaginous fishes are osmoconformers but are ionoregulators.	3. Some marine invertebrates are osmoregulators. Marine bony fishes are osmoregulators. All freshwater fishes are osmoregulators. Terrestrial animals are invariably osmoregulators.

2. Anhydrobiosis with Examples:-

1. Anhydrobiosis refers to tolerate dehydration.
2. It differs in various animals.
3. It enables animals to survive the loss of all body water

and desiccation.

Example:-

Tardigrade (Water bear), an invertebrate of about 1mm.

3. Filtration Taking place only at Glomeruli Part of Nephron:-

Filtration takes place only at glomeruli part of nephron and nowhere else because:

- a. Glomeruli walls are porous and; ▲
- b. Fraction of the blood reaching glomeruli part provides the filtration pressure.

4. Mention Two Metabolic Altered States Causing Kidney Stone Formation:-

The two metabolic altered states, that generally (70 %)

cause kidney stone formation, are:

1. Hypercalcemia — A raised level of calcium in the blood
2. Hyperoxalurea — A high level of oxalates in urine

5. Renal Failure:-

Renal failure is a condition in which kidneys fail to filter waste products from blood and excrete them in urine. As a result the nitrogenous wastes start accumulating in the blood which leads to high blood pressure, anemia etc.

Renal failure occurs in two main categories:

1. **Acute Renal Failure**, in which the kidneys abruptly stop working entirely or almost entirely but may eventually recover nearly normal function, and
2. **Chronic Renal Failure**, in which there is progressive

loss of function of more and more nephrons that gradually decrease overall kidney function.

6. A) One Adaptation in Plants to High Temperature:-

The cells of the plants living in temperate regions manage with the stress of 40 °C and above temperature by synthesizing Heat Shock Proteins

that

prevent the denaturation of enzymes and other proteins. Or

Plants use evaporating cooling to manage with high temperature, however they close stomata on hot and dry weather.

B) One Adaptation in Plants to Low Temperature:-

The plants native to cold region such as oaks,

maples,

roses and other plants have adapted to bring changes in solute composition of the cells, which causes cytosol to super cool without ice formation,

although

ice crystals may form in the cell walls. Or

Plants respond to cold stress by increasing

proportion

of unsaturated fatty acids, which help membrane to maintain structure at low temperature by preventing crystal formation.

II) From Punjab Boards:-**LAHORE BOARD QUESTIONS**

1. What are the differences between osmoconformers And osmoregulators. (Lahore Board (A) 2008)
2. What are the differences between ureotelic and uricotelic animals? (Lahore Board (A) 2008)
3. Explain Pyrexia. (Lahore Board (A) 2008)
4. What techniques are used to remove the kidney stones? (Lahore Board (A) 2009)
5. Differentiate between ureter and urethra. (Lahore Board (A) 2009)
6. Differentiate between ectotherm and endotherm. (Lahore Board (A) 2009)
7. Give structural formulae of urea and uric acid. (Lahore Board (A) 2010)

8. Distinguish between hypotonic and hypertonic environment. (Lahore Board (A) 2010)
9. Illustrate the functions of Malpighian tubules? (Lahore Board (A) 2010)
10. Define homeostasis. (Lahore Board (A) 2011)
11. What are osmoregulators? (Lahore Board (A) 2011)
12. Why leaves are said to be excretophore? (Lahore Board (A) 2011)
13. Write structural formula of urea and uric acid. (Lahore Board Group I (A) 2012)
14. Differentiate between Xerophyte and Mesophyte plants. (Lahore Board Group I (A) 2012)
15. What are poikilotherms? Give one example. (Lahore Board Group I (A) 2012)
16. Differentiate between hypotonic and hypertonic environment. (Lahore Board Group II (A) 2012)
17. Define anhydrobiosis with an examples (Lahore Board Group II (A) 2012)
18. Differentiate between osmoconformers and osmoregulators. (Lahore Board Group II (A) 2012)
19. Define homeostasis. Give its importance. (Lahore Board Group I (A) 2013)
20. Explain the process of panting with example. (Lahore Board Group I (A) 2013)
21. What does ADH and how does it function? (Lahore Board Group I (A) 2013)
22. Differentiate between ectotherms and endotherms. (Lahore Board Group II (A) 2013)
23. What are poikilotherms? Give one example. (Lahore Board Group II (A) 2013)
24. What are pyrogens? (Lahore Board Group II (A) 2013)
25. What is homeostasis? (Lahore Board-Academic Session-2010-2013)
- (Group-II-2014-A)
26. Why leaves are said to be excretophore? (Lahore Board-Academic Session-2010-2013)
- (Group-II-2014-A)
27. Define urea cycle. (Lahore Board-Academic Session-2010-2013)
- (Group-II-2014-A)
28. What are hydrophytes? What are their important adaptations? (Lahore Board-Academic Session-2012-2014)

- (Group-II-2014-A)
29. Define anhydrobiosis with an example. (Lahore Board-Academic Session-2012-014)
- (Group-II-2014-A)
30. What are flame cells and why are these called so? (Lahore Board-Academic Session-2012-2014)
- (Group-II-2014-A)
31. Compare osmoconformers and osmoregulators (Lahore Board-Academic Session-2012-2014)
- (Group-I-2014-A)
32. What are flame cells, give their role? (Lahore Board-Academic Session-2012-2014)
- (Group-I-2014-A)
33. What is extracorporeal shockwave lithotripsy? (Lahore Board-Academic Session-2012-2014)
- (Group-I-2014-A)

Answers

1. Differences between Osmoconformers and Osmoregulators:

See Exercise Chapter No: 15 Answer No: 1

2. Differences between Ureotelic and Uricotelic Animals:

Ureotelic Animals	Uricotelic Animals
1. These animals usually excrete urea as their main nitrogenous wastes. 2. Urea which these animals excrete is more toxic than uric acid, highly soluble in water. 3. These animals live in areas where moderate amount of water is available. 4. Terrestrial mammals are ureotelic. In addition to mammals, most amphibians, sharks, some bony fishes also excrete urea. Humans excrete little uric acid but urea is the predominant nitrogenous waste.	1. These animals excrete uric acid as excretory product. 2. Uric acid which these animals excrete is less toxic than urea, highly insoluble in water. 3. These animals inhabit arid environment. 4. Terrestrial animals such as birds, many reptiles, insects, terrestrial snails and other gastropods are uricotelic.

3. Pyrexia:

In bacterial and viral infection, leucocytes increase in number. These pathogens and white blood cells produce chemicals called as pyrogens which displace the set of hypothalamus above the normal point of 37 °C. This is called High Temperature or Fever or

Pyrexia that helps in stimulating the protective mechanism against the pathogens.

4. Techniques used to remove the kidney stones: -

Of many techniques which are used to remove the kidney stones, lithotripsy is one of them. It is the

non-surgical removal of kidney stones in which shock waves, x-rays or ultrasonic waves (ultrasound) are directed from a machine outside the body to break

the stone inside. Extracorporeal shock wave lithotripsy

is the most common and advanced method in which shock waves are focused on the stone to break the stone into tiny pieces or into sand which are passed out of the body in urine.

5. Differences between Ureter and Urethra.

Ureter	Urethra
1. Ureter is a tubular structure that links each kidney to the urinary bladder.	1. Urethra is a tubular structure that connects urinary bladder to the outside of the body. In males it passes through penis while in females its opening is just above the opening of vagina.
2. There is a pair of ureters in each individual.	2. There is a single urethra in each individual.
3. Ureters are of the same length both in males and females.	3. Urethra is longer in the male than the female.
4. It carries urine from kidney to the urinary bladder in both sexes.	4. In females urethra transports urine from the urinary bladder to the exterior while in males urethra not only transports urine from the urinary bladder to exterior but is also a semen duct carrying sperms from sperm duct to the exterior.

6. Differentiate between Ectotherm and Endotherm: -

Ectotherms	Endotherms
1. Ectotherms are the animals that do not produce heat by metabolism. They also lack mechanism to retain heat.	1. Endotherms are the animals that generate heat by metabolism and keep it in the body.
2. They have relative low metabolic rate that tends to change with the weather.	2. They have high rate of metabolism even when they are inactive.
3. They depend on the environment to regulate their body temperature. Most of the heat for their thermoregulation comes from the sun.	3. Maintenance of their body temperature is independent of environmental temperature.
4. Most ectotherms have behavioral strategies to adjust their body	4. They use structural, physiological and behavioral mechanisms to regulate body temperature.
	5. They can operate effectively in fairly low temperatures, so they can

temperature including basking in the sun, hibernation and migration.

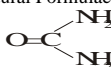
5. Their distribution is limited to areas with temperature range of 5-10 °C to 35-40 °C. The daily and seasonal temperature conditions may also limit their activity.

6. Most invertebrates, fish, amphibians and reptiles are ectotherms

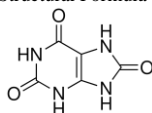
live in cold regions. Their activity also does not depend on daily and seasonal temperature. 6. Birds and mammals are endotherms. Endotherms also include some fishes and flying insects.

7. Structural Formulae: -

a. Structural Formulae of Urea: -



b. Structural Formula of Uric Acid: -



8. Distinguish between Hypotonic and Hypertonic Environment:-

Hypotonic Environment	Hypertonic Environment
1. It is a more diluted external environment with lower concentration of solute (higher concentration of water) than the cytoplasm of a cell.	1. It is a more concentrated external environment with a higher concentration of solute (lower concentration of water) than the cytoplasm of a cell.
2. Water enters into the cell causing it to swell or turgid.	2. Water diffuses out of the cell causing it to shrink.
3. It renders cell solutions diluted.	3. It renders cell solutions concentrated.

9. Functions of Malpighian Tubules: -

Malpighian tubules function as excretory organs in terrestrial arthropods (especially insects). Cells of tubule walls actively transport uric acid from the hemolymph into the lumen of tubules and is

discharged into hindgut of the insect and excreted with feces.

Or

1. Malpighian tubules function as excretory organs in insects.

2. Malpighian tubules also conserve water.

10. Homeostasis: -

1. The protection of internal environment from the harms

of the fluctuations in external environment is termed as homeostasis. Or

It is defined as a set of regulatory mechanisms which are involved in maintaining an organism's internal environment within suitable limits.

2. The homeostasis keeps the internal fluctuations in a narrow range with various control systems compared to wider external fluctuations. It usually involves some

form of feedback self-regulation.

11. Osmoregulators: -

1. The animals whose body fluid concentrations differ noticeably the outside environment, actively regulate to discharge excess water in hypotonic and excrete salts in hyoertonic conditions therefore, are called as osmoregulators.
2. All freshwater animals are osmoregulators because it is impossible for them to have body fluids as dilute as freshwater. Some marine animals such as bony fishes are osmoregulators. Terrestrial animals are invariably osmoregulators.

12. Leaves as Excretophore: -

Leaves are said to be excretophore because plants get rid of accumulated wastes by falling of yellow leaves in the autumn.

13. Structural Formulae of Urea and Uric Acid: -

See Lahore Board Answer No: 7

14. Differentiate between Xerophyte and Mesophyte Plants: -

Xerophyte Plants	Mesophyte Plants
1. They live in dry places such as deserts, steep hills etc.	1. They grow in well watered soil.
2. They have water scarcity.	2. They have moderate water availability.
3. They have adaptations with reduced rate of transpiration such as thick and waxy cuticle, stomata in lower depressions of leaves, shedding of leaves during driest season etc.	3. They have different adaptations in excess and restricted supply of water such as opening of stomata during sufficient supply of water and closing of stomata during restricted supply of it.

15. Poikilotherms with one Example:-

1. The animals in which body temperature tends to fluctuate more or less with ambient temperature where air or water temperatures are changed are called Poikilotherms.
2. Poikilothermic means 'having a variable temperature'.
3. They are described as 'cold blooded'.
4. Their body temperature is changing with fluctuations in the environmental temperature. If the environment is cold, so is their blood.
5. Example: -Fishes, Frog etc.

16. Differences between hypotonic and hypertonic environment.

See Lahore Board Answer No: 8

17. Anhydrobiosis with an Example: -

Exercise Chapter No: 15 Answer No: 2

18. Differences between osmoconformers and osmoregulators: -

See Exercise Chapter No: 15 Answer No: 1

19. A) Homeostasis: -

See Lahore Board Answer No: 10

B) Importance of Homeostasis: -

1. It protects the animal from the harms of fluctuation in

the external environment.

2. It compels the adaptations in the constant changing environment and contributes in evolutionary process.

20. Panting with Example: -

1. It is the evaporative cooling in the upper respiratory tract.
2. The fur animals or the animals whose skin is not supplied with sweat glands such as dogs, cats adopt the mechanism of panting as a means of dissipating heat.
3. Bats etc use saliva and urine for evaporating cooling.
4. During panting metabolic rate of the body is decreased so less heat is generated by the body.

21. A) ADH: -

1. It means Antidiuretic Hormone.
2. It is also known as Vasopressin.
3. It is polypeptide in nature.
4. It is a hormone that is secreted by posterior lobe of pituitary gland.

B) Working of ADH: -

It acts actively to transport water from filtrate in the collecting tubules back to kidney.

22. Differences between Ectotherms and Endotherms:-

See Lahore Board Answer No: 6

23. Poikilotherms with one Example:

See Lahore Board Answer No: 15

24. Pyrogens: -

1. Chemical substances produced during bacterial and viral infections from the pathogen and leukocytes that displace the set point of hypothalamus above the normal point of 37 °C are called Pyrogens. Or The substances that are released from toxic bacteria

or from degenerating tissues of the body or from leukocytes, which cause fever during infection are called Pyrogens.

2. They can act on the hypothalamic temperature regulating center to increase its set point or they

may function indirectly.

25. Homeostasis: -

See Lahore Board Answer No: 10

26. Leaves as Excretophore: -

See Lahore Board Answer No: 12

27. Urea cycle: -

The metabolic pathways involved in the production of urea are termed as urea cycle. Or It is a series of energy requiring chemical reactions

in the cells of liver in which ammonia combines with carbon dioxide and is converted to a less toxic substance "urea". Or

1. Synthesis of urea from ammonia and carbon dioxide by a sequence of reactions is known as Urea cycle.
2. It requires specific enzymes.
3. It occurs in the cells of liver.
4. It is also known as Ornithine cycle.

28. A) Hydrophytes: -

The plants which are found in freshwater habitat either partly or completely submerged are called Hydrophytes.

Or

Aquatic plants are called Hydrophytes.

B) Their Important Adaptations: -

Hydrophytes have adaptations to remove the flooding of their cells in freshwater, such as large surface area of leaves to transpire water excessively and extensive stomata on the upper surface to promote loss of water.

Or

- The stem and leaves of hydrophytes generally lack cuticle.
- In case of partially submerged plants the surface area of their leaves is very large.
- Their leaves float on the surface of water as in partially submerged plants.
- A large number of stomata are restricted on the upper surfaces of leaves in partially submerged hydrophytes.

29. Anhydrobiosis with an Example: -

Exercise Chapter No: 15 Answer No: 2

30. A) Flame Cells: -

Flame cells are blind bulb like cells with a cavity bearing a tuft of cilia in along the branching excretory tubules or protonephridia of flatworms.

B) Why Flame Cells called so: -

The tuft of cilia in the cavity of flame cells beat in a manner like flickering flame cell hence these cells are called flame cells.

31. Comparison of Osmoconformers and Osmoregulators: -

See Exercise Answer No: 1

32. A) Flame cells: -

See Lahore Board Answer No: 30 (A)

B) Role of Flame Cells: -

They propel nitrogenous wastes present in interstitial fluid into tubular system to be disposed outside through nephridiopores.

33. Extracorporeal Shockwave Lithotripsy: -

Extracorporeal shockwave lithotripsy is the most common in which high concentration of X-ray or ultrasound are directed from a machine outside the body to the stone inside that is broken down into pieces or into sand and pass out of the body in urine.

GUJRANWALA BOARD QUESTIONS

- Explain the term homeostasis. (Gujranwala Board (A) 2008)
- Differentiate between osmoregulation and thermoregulation. (Gujranwala Board (A) 2009)
- Define anhydrobiosis with an example.

(Gujranwala Board (A)

2009)

- Define the term homeostasis.

(Gujranwala Board (A)

2010)

- How do most plants have adapted to thrive in heat stress? (Gujranwala Board (A) 2010)
- Differentiate between protonephridium and metanephridium. (Gujranwala Board (A) 2011)
- Explain about dialysis. (Gujranwala Board (A) 2011)
- Differentiate between hypotonic and hypertonic solution. (Gujranwala Board (A) 2011)
- Differentiate between ectotherms and endotherms. (Gujranwala Board (A)

2012)

- What are osmoregulators?

(Gujranwala Board (A)

2012)

- What is hemodialysis?

(Gujranwala Board (A)

2012)

- What is uremia? (Gujranwala Board (A) 2013)
- Define homeotherms. (Gujranwala Board (A) 2013)
- What is lithotripsy? (Gujranwala Board (A) 2013)
- Define homeostasis.

(Gujranwala Board (New Course) 2014-

A)

- What is anhydrobiosis?

(Gujranwala Board (New Course) 2014-

A)

- What is counter current multiplier?

(Gujranwala Board (New Course) 2014-

A)

- What is metanephridium?

(Gujranwala Board-New Scheme-2015-

A)

- Sketch urea cycle.

(Gujranwala Board-New Scheme-2015-

A)

- What is counter-current multiplier?

(Gujranwala Board-New Scheme-2015-

A)

Answers**1. Homeostasis: -**

See Lahore Board Answer No: 10

2. Differentiate between Osmoregulation and Thermoregulation: -

Osmoregulation	Thermoregulation
1. It involves maintaining a balance between water and solute contents of cells of organisms.	1. It is the ability of organisms to maintain body temperature within narrow range.
2. It keeps body fluids or cytoplasm from becoming too dilute or too concentrated.	2. It limits the internal temperature of the body within a range that enables it to function effectively.

3. Anhydrobiosis with an Example: -

Terrestrial animals can tolerate dehydration and it differs in various animals. This characteristics is known as anhydrobiosis.

Example: -

Some invertebrates, such as several species of nematodes, literally have the ability to dry up under adverse conditions.

(Note: In a situation of extreme desiccation an animal

stops all its metabolic processes preventing reproduction, development and repair. When conditions become favorable for the animal, it will return to its metabolic state of life).

4. Homoestasis: -

See Lahore Board Answer No: 10

5. Adaptations of Plant in Heat Stress: -

1. A plant keeps cool by transpiration, the evaporation of

water through stomata at the surface of leaves.

2. Shiny cuticle is useful in that it reflects heat.

3. They have small leaves. Having a small leaf area is another way of reducing the uptake of heat.

4. Plants respond to high temperature by synthesizing Heat Shock Proteins that prevent the denaturation of enzymes and other proteins.

6. Differentiate between Protonephridium and Metanephridium: -

Protonephridium is the excretory structure that has

no internal opening, instead its blind end has flame cell with tuft of cilia.

Example: Planaria and other flatworms

Metanephridium is the excretory structure that has

an internal funnel shaped opening Nephrostome in the coelom.

Example: Earthworm and other Annelids. Or

Protonephridium	Metanephridium
1. It is a tubule without internal opening. However, it opens to the exterior through nephridiopore.	1. It is a tubule that ends at both ends, internally it opens as a ciliated funnel nephrostome and externally it opens through nephridiopore.
2. It is a system of two longitudinal branching tubules laying on either lateral side and extending along the entire length of the animal.	2. It is a system of segmentally arranged tubules, usually one pair per segment.
3. It is capped a cellular set up termed as flame cell.	3. It lacks flame cells.
4. It collects nitrogenous wastes from tissue fluid or interstitial fluid.	4. It collects nitrogenous wastes from a coelomic fluid.
5. It usually excretes ammonia.	5. It usually excretes urine.
6. It is found in flatworms, some annelids and nemerteans.	6. It is found in most annelids and some mollusks.

7. Dialysis: -

Dialysis is a technique used to remove waste products from the blood and excess fluids from the body as a treatment for chronic renal failure. There are two methods of dialysis.

a. Hemodialysis ---- It is done outside the body with artificial kidney, the basic principle of which is to pass

blood through minute canals bounded by a thin membrane. On the other side of the membrane is a dialyzing fluid into which unwanted substances in

the blood pass by diffusion.

b. Peritoneal dialysis ---- It is done inside the body in which peritoneal membrane is utilized as semipermeable membrane.

8. Differences between Hypotonic and Hypertonic solution:

Hypotonic Solution	Hypertonic Solution
1. Hypotonic is a solution with low solute concentration than the cytoplasm of a cell.	1. Hypertonic is a solution with higher solute concentration than that of the cytoplasm of a cell
2. Water enters into to the cell causing it to swell or turgid.	2. Water diffuses out of the cell causing it to shrink.
3. It renders cell solution diluted.	3. It renders cell solutions concentrated.

9. Differentiate between Ectotherms and Endotherms: -

See Lahore Board Answer No: 6

10. Osmoregulators: -

See Lahore Board Answer No: 11

11. Hemodialysis: -

Hemodialysis means 'cleaning the blood'. In this procedure blood is circulated through a machine which contains a dialyzer also called an artificial kidney. Dialyzer has two spaces separated by thin membrane. Blood passes from one side of the fluid and dialyzing fluid on the other. The wastes and excess water pass from the blood through the membrane into the dialysis fluid.

12. Uremia: -

1. It is a high degree of renal failure.
2. It is also called end-stage renal disease (ESRD)
3. It is usually characterized by an accumulation of an excessive amount of urea and other nitrogenous wastes in the blood.
4. In uremia there is a marked increase in the concentration of urea and creatinine in the blood.
5. In uremia the dialysis cannot be done hence the surgical transplantation of a matching donor kidney is

the only option left for as the permanent treatment.

13. Homeotherms: -

1. Homiothermic animals or homeotherms are popularly described as 'warm blooded'.
2. They have high metabolic rates.
3. These animals include birds and mammals.
4. These animals which have the ability to maintain relatively constant internal temperature (about 37 °C

for mammals and about 40 °C for birds), regardless of environmental temperature.

14. Lithotripsy: -

1. Lithotripsy is used for non-surgical removal of kidney stone.
2. It is used to break up stones that form in the kidney, ureter or gall bladder.
3. Extracorporeal shockwave lithotripsy is the most common in which high concentration of X-ray or ultrasound are directed from a machine outside the body to the stone inside that is broken down into pieces or into sand and pass out of the body in urine.

Or

1. Lithotripsy is a recent method for removing kidney and ureteral stones.
2. In lithotripsy ultrasonic waves or shock waves are used to break the stone.
3. Shock wave lithotripsy is more advanced method in which shock waves are being focused on stones from outside the body. After being broken small pieces of stones are passed in urine.

15. Homeostasis: -

See Lahore Board Answer No: 10

16. Anhydrobiosis: -

Exercise Chapter No: 15 Answer No: 2

17. Counter Current Multiplier: -

See Faisalabad Board Answer No: 22

18. Metanephridium: -

See Multan Board Answer No: 29

19. Sketch of Urea Cycle: -

See Faisalabad Board Answer No: 4

20. Counter-Current Multiplier: -

See Faisalabad Board Answer No: 22

MULTAN BOARD QUESTIONS

1. What is homeostasis? (Multan Board (A) 2008)
2. What is glomerulus? (Multan Board (A) 2008)
3. Differentiate between, Osmoregulation and Thermoregulation. (Multan Board (S) 2008)
4. Write about Hydrophytes. (Multan Board (S) 2008)
5. What is anhydrobiosis? (Multan Board (S) 2008)
6. What marine fishes do for osmoregulation? (Multan Board (A) 2009)
7. What is Blubber and in which animals is it found? (Multan Board (A) 2009)
8. Differentiate between Hypercalcemia and Hyperoxalurea. (Multan Board (S) 2009)
9. Define Anhydrobiosis. Give example of organism that show this phenomenon. (Multan Board (S) 2009)
10. What are Pyrogens? (Multan Board (A) 2010)
11. Differentiate between Shivering. Thermogenesis and Non-Shivering. Thermogenesis. (Multan Board (A) 2010)
12. Why are leaves said to be excretophore? (Multan Board (A) 2010)

13. Define Pyrogens. How these affect the Hypothalamus? (Multan Board (S) 2010)
14. What Uremia? Give its treatment. (Multan Board (S) 2010)
15. Differentiate Poikilotherms with Homeotherms. (Multan Board (S) 2010)
16. Illustrate the function of malpighian tubules. (Multan Board (A) 2011)
17. Define Homeostasis. Give its importance. (Multan Board (A) 2011)
18. Give the structural formulae of Urea and Uric Acid. (Multan Board (A) 2011)
19. Differentiate between Hydrophytes and Xerophytes. (Multan Board (S) 2011)
20. Define Excretophores. (Multan Board (S) 2011)
21. What are Osmoconformers? (Multan Board (S) 2011)
22. What are Mesophytes? (Multan Board (A) 2012)
23. How Malpighian tubules take part in excretion? (Multan Board (A) 2012)
24. What are the effects of ADH and aldosterone on work of nephron? (Multan Board (A) 2012)
25. What is a renal failure? (Multan Board (S) 2012)
26. Write two types of synthesis functions of liver and effects on homeostasis. (Multan Board (S) 2012)
27. Define anhydrobiosis with an example. (Multan Board (S) 2012)
28. Differentiate between, Osmoregulation and Thermoregulation. (Multan Board (A) 2013)
29. What is Metanephridium? (Multan Board (A) 2013)
30. Define Homeostasis. (Multan Board (A) 2013)
31. What is Lithotripsy? (Multan Board (Old Scheme) (A) 2014)
32. What is Renal Failure? (Multan Board (Old Scheme) (A) 2014)
33. Differentiate between Shivering and Non-shivering Thermogenesis. (Multan Board (Old Scheme) (A) 2014)
34. Define Mesophytes. Give an example. (Multan Board (New Scheme) (A) 2014)
35. What are Osmoconformers? (Multan Board (New Scheme) (A) 2014)
36. Differentiate between Ureotelic and Uricotelic Animals. (Multan Board (New Scheme) (A) 2014)
37. Define Glomerular Filtrate. (Multan Board-New Scheme-2015-A)
38. What are Heat Shock Proteins?

(Multan Board-New Scheme-2015-

A)

39. Define Panting with one example.

(Multan Board-New Scheme-2015-

A)

Answers**1. Homeostasis: -**

See Lahore Board Answer No: 10

2. Glomerulus: -

1. Glomerulus is a round ball of capillaries.
2. It circulates blood through Bowman's capsule as it arrives through afferent arterioles and leaves the capsule by efferent arterioles. Or
1. It is a ball or dense network of capillaries, laying inside the cup of Bowman's capsule
2. It is derived from afferent arteriole.
3. From the glomerulus, blood is carried by efferent arteriole to peritubular capillaries and vasa recta.
4. It is the place where blood passing through it, is filtered into Bowman's capsule.

3. Difference between Osmoregulation and Thermoregulation.

See Gujranwala Board Answer No: 2

4. Hydrophytes: -

1. Hydrophytes are the plants which live completely or partially submerged in water.
2. Their emergent leaves have a large surface area for photosynthesis.
3. Their floating leaves have large area to transpire water excessively.
4. Extensive stomata are present on the upper surface of floating leaves facing the atmosphere to promote loss of water.
5. Their stem and leaves generally lack cuticle.

5. Anhydrobiosis: -

Exercise Chapter No: 15 Answer No: 2

6. Osmoregulation in Marine Fishes:**a. Osmoregulation in Cartilaginous Fishes:**

They maintain lower internal salt concentration than that of surrounding sea water by storing high concentration of urea in their body. Because urea in high concentration is damaging, so these fishes retain

another chemical trimethylamine oxide for protection against urea. Thus they do not have problem of

water loss. Excess salts are removed by special glands in their rectum (rectal glands) and by gills.

b. Osmoregulation in Marine Bony Fishes:

Marine bony fishes have hypotonic internal environment so they lose water. Thus, in order to conserve water they constantly drink water. The salts

taken in along water are actively excreted by gills. Moreover they excrete concentrated urine resulting

in maximum salt excretion and minimum water loss.

7. A) Blubber: -

1. Blubber is a very thick layer of insulating fat just

under the skin in marine mammals living in much colder water than their body temperature.

2. It accounts for about 25 % of their body weight.
3. It protects them from the cold.

B) Animals having Blubber: -

Blubber is found in aquatic mammals such as seals, whales, dolphin, walrus etc.

8. Differences between Hypercalcemia and Hyperoxalurea: -

Hypercalcemia	Hyperoxalurea
1. Hypercalcemia refers to a raised level of calcium in the blood.	1. Hyperoxalurea refers to a high level of oxalates in urine.
2. Calcium present in milk, butter, cheese etc. is the main contributing factor for hypercalcemia.	2. Oxalates present in green vegetables and tomatoes may be the source of hyperoxalurea.
2. Hypercalcemia is the contributing factor for the formation of calcium oxalate as well as calcium phosphate stones in the kidney.	3. Hyperoxalurea is the contributing factor for formation of calcium oxalate stones in the kidney.

9. Anhydrobiosis with Example: -

Exercise Chapter No: 15 Answer No: 2

10. Pyrogens: -

See Lahore Board Answer No: 24

11. Differences between Shivering Thermogenesis and Non-Shivering Thermogenesis: -

Shivering Thermogenesis	Non-Shivering Thermogenesis
1. Production of heat by involuntary contractions of the skeletal muscles is called Shivering Thermogenesis.	1. Production of heat triggered by hormones is called Non-Shivering Thermogenesis.
2. Control center for shivering thermogenesis is located in the posterior hypothalamus.	2. Control center for non-shivering thermogenesis lies in the anterior hypothalamus.
3. Posterior hypothalamus is activated when the body temperature falls even a fraction of a degree below a critical temperature level.	3. Under persistent cooler conditions, the anterior hypothalamus is activated.
4. During shivering thermogenesis first tone of the skeletal muscle is increased and when it rises above a certain critical level then shivering begins.	4. During non-shivering thermogenesis basal metabolism is raised and heat is produced, in short term by the secretion of adrenaline and in long term by secretion of another hormone, thyroxine.

12. Leaves as Excretophore: -

See Lahore Board Answer No: 12

13. A) Pyrogens: -

See Dera Ghazi Khan Board Answer No: 17 (A)

B) Effect of Pyrogen on Hypothalamus: -

They are carried by the blood to the brain and direct neurons in the hypothalamus to raise the body's temperature several degree above the normal value of

37 °C (98.6 °F). Or

Their effect on hypothalamus is to displace the set point of hypothalamus above the normal point of 37 °C.

Or
They can cause the set point of hypothalamus to rise to inhibit the growth of microorganisms.

14. A) Uremia: -

It is a high degree of renal failure.

B) Treatment of Uremia: -

Kidney transplantation is the only treatment for uremia.

15. Differences between Poikilotherms and Homeotherms:

Poikilotherms	Homeotherms
1. They are commonly known as cold blooded animals.	1. They are commonly known as warm blooded animals.
2. Their temperature changes in accordance with the fluctuations of environmental temperature.	2. Their body temperature is independent of the environmental temperature.
3. They depend upon environmental warmth for metabolic functioning.	3. They have high metabolic rates.
4. The distribution of terrestrial cold blooded animals is limited.	4. They are also found in extremely cold regions.
5. Fishes, amphibians and reptiles are cold blooded animals.	5. These animals include birds and mammals.

16. Function of Malpighian Tubules: -

See Lahore Board Answer No: 9

17. A) Homeostasis: -

See Lahore Board Answer No: 10

B) Importance of Homeostasis: -

See Lahore Board Answer No: 19

18. Structural formulae of Urea and Uric Acid: -

See Lahore Board Answer No: 7

19. Differences between Hydrophytes and Xerophytes:

Hydrophytes	Xerophytes
1. They are aquatic plant,	1. They are desert plants or plants found on steep mountains.
2. They do not have any difficulty in obtaining water.	2. They have to face scarcity of water.
3. They have adaptations to remove the flooding of their cells in freshwater.	3. They have the adaptations for reduced rate of transpiration and conservation of water.
4. Their stem and leaves usually lack cuticle to transpire excessively.	4. They have thick, leathery and waxy cuticle to prevent excessive water loss.
5. Their leaves have large surface area to transpire water excessively.	5. Their leaves are small and needle like that help to reduce water loss by transpiration.
6. A large number of stomata are present on the upper surface of leaves to promote loss of water	6. Few stomata are present on lower surface of leaves in depressions to restrict loss of water.

Examples:-

Water Lilly, Hydrilla etc.

Examples: -

Cacti, Acacia etc.

20. Excretophores: -

1. Excretophores are the organs of plants which are used for the disposal of excretory products from plants.
2. Plants get rid of their accumulated wastes by falling of yellow autumn leaves, hence these leaves are called excretophores
3. Yellow color of these leaves is not due to removal of chlorophyll but is due to loading of pigmented compounds and toxic materials such as heavy metals prior to falling off.

21. Osmoconformers: -

1. The animals, whose body fluids are kept isotonic to external environment even for marine saltwater environment, are called Osmoconformers.
2. Osmoconformers are in osmotic equilibrium with their environment.
3. There is no need for these animals to osmoregulate.
4. Most marine invertebrates are osmoconformers. Among vertebrates, only primitive hagfish are strict osmoconformers. Sharks, rays and other cartilaginous fishes are also isotonic to seawater due to retention of urea in their blood, even though their blood level of sodium chloride is lower than that of sea water.

22. Mesophytes: -

1. Mesophytes are the plants which grow in normally well-watered soil. OR
These are the plants which live where water is in adequate supply.
2. They have moderate water availability.
3. They have developed a water proof external cuticle on stem and leaves to prevent excessive transpiration.
4. They open stomata in sufficient supply of water to promote loss of excess water and close stomata in restricted supply of water to prevent its loss.
5. Usually the water which they lose by transpiration is readily replaced by uptake from soil, and so they require no special means of conserving water.

23. Function of Malpighian Tubules: -

See Lahore Board Answer No: 9

24. Effects of ADH and Aldosterone on Working of Nephron: -

1. ADH increases the water permeability of collecting ducts of nephrons, limiting its amount to be excreted.
2. Aldosterone promotes the uptake of sodium in the ascending limb or thick loop of Henle, conserving its level in the body.

25. Renal Failure: -

See Exercise Chapter No: 15 Answer No: 5

26. A) Two Synthesis Functions of liver: -

1. It synthesizes bile.
2. It synthesizes urea from ammonia and carbon dioxide.

B) Their Effects on Homeostasis: -

1. Bile emulsifies fats in the small intestine.

2. It supports kidney in waste disposal.

OR

A) Two Synthesis Functions of liver: -

1. It makes plasma proteins, such as albumin and fibrinogen, from amino acids.

2. It forms cholesterol.

B) Their Effects on Homeostasis: -

1. Fibrinogen is a protein responsible for the clotting of blood.

2. Some of cholesterol is required as an important constituent of cell membrane, particularly of nerve cell. Excess cholesterol is excreted in the bile.

OR

A) Two Synthesis Functions of liver: -

1. It synthesizes lipids, cholesterol and lipoproteins.

2. It synthesizes albumin, a plasma protein.

B) Their Effects on Homeostasis: -

1. These regulate blood chemistry, store energy and help to maintain cell membranes.

2. It maintains osmotic balance of blood.

27. Anhydrobiosis with an Example: -

Exercise Chapter No: 15 Answer No: 2

28. Difference between Osmoregulation and Thermoregulation: -

See Gujranwala Board Answer No: 2

29. Metanephridium: -

1. It is a tubule that ends at both ends, internally it opens

as a ciliated funnel nephrostome and externally it opens through nephridiopore.

2. It is a system of segmenatly arranged tubules, usually

one pair per segment.

3. It collects nitrogenous wastes from the coelomic fluid.

4. It is surrounded by a network of capillaries. As fluid moves along the tubule salts and other nutrient substances reabsorbed and carried away by these capillaries.

5. It usually excretes urine.

6. It is found in most annelids and some mollusks.

30. Homeostasis: -

See Lahore Board Answer No: 10

31. Lithotripsy: -

See Gujranwala Board Answer No: 14

32. Renal Failure:

a. Renal Failure:

Renal failure is the failure of kidney to produce urine

in the normal way.

b. Chronic Renal Failure:

In chronic renal failure, the function of the kidney is completely lost and it is unable to remove

nitrogenous

wastes.

c. Usual Causes of Renal Failure:

Usual causes of Renal Failure are various factors of pathological and chemical nature that may destroy the

nephron, particularly its glomerular part.

d. Consequences:

There is an increase in the plasma level of urea and other nitrogenous wastes.

e. Complications:

Rise in plasma level of urea causes complications of

increase in blood pressure and anemia etc.

33. Differences between Shivering Thermogenesis and Non-Shivering Thermogenesis: -

See Multan Board Answer No: 11

34. Mesophytes: -

See Multan Board Answer No: 22

35. Osmoconformers: -

See Multan Board Answer No: 21

36. Differences between Ureotelic and Uricotelic Animals:-

See Lahore Board Answer No: 2

37. Glomerular Filtrate: -

See Bahawalpur Board Answer No: 16

38. Heat Shock Proteins: -

Heat Shock Proteins are the proteins which are produced by the plants in response to high

temperature

that prevent the denaturation of enzymes and other proteins.

39. A) Panting: -

1. It is the evaporative cooling in the upper respiratory tract.

2. During panting metabolic rate of the body is decreased

so less heat is generated by the body.

B) One Example: -

Panting is found in dogs.

BAHAWALPUR BOARD QUESTIONS

1. Differentiate between Hydrophytes and Xerophytes.

(Bahawalpur Board (A)

2008)

2. What are heat shock proteins?

(Bahawalpur Board (A)

2008)

3. Write about Lithotripsy. (Bahawalpur Board (S) 2008)

4. What is dialysis? (Bahawalpur Board (S) 2008)

5. Differentiate between hypotonic and hypertonic solution.

(Bahawalpur Board (S)

2008)

6. What is Renal Failure? (Bahawalpur Board (S) 2009)

7. What is the role of hormones in human kidney?

(Bahawalpur Board (S)

2010)

8. What is dialysis? (Bahawalpur Board (A) 2010)

9. What is Non-Shivering Thermogenesis?

(Bahawalpur Board (A)

2010)

10. Differentiate Hemodialysis from Peritoneal dialysis.

(Bahawalpur Board (A)

2010)

11. Give two adaptations of plants to high temperature condition.

(Bahawalpur Board (A) 2011)

12. Give the procedure of Hemodialysis.

(Bahawalpur Board (A)

2011)

13. Differentiate between Cortical and Juxtamedullary Nephrons. (Bahawalpur Board (A) 2011)
14. Define Urea Cycle. (Bahawalpur Board (A) 2012)
15. Differentiate between Osmoconformers and Osmoregulators. (Bahawalpur Board (A) 2012)
16. Explain briefly Glomerular Filtrate. (Bahawalpur Board (A) 2012)
17. Differentiate between Ureotelic and Uricotelic. (Bahawalpur Board (A) 2013)
18. Define Anhydrobiosis. (Bahawalpur Board (A) 2013)
19. What is Flame Cell? Give one example. (Bahawalpur Board (A) 2013)
20. Explain the term Homeostasis. (Bahawalpur Board-New Scheme-2014-A)
21. How the most plants have adapted to survive in heat stress? (Bahawalpur Board-New Scheme-2014-A)
22. What is Protonephridium? (Bahawalpur Board-New Scheme-2015-A)
23. Give two adaptations of Xerophytes for Osmoregulation. (Bahawalpur Board-New Scheme-2015-A)
24. Differentiate between Osmoconformers and Osmoregulators. (Bahawalpur Board-New Scheme-2015-A)

Answers

1. Differences between Hydrophytes and Xerophytes:

See Multan Board Answer No: 19

2. Heat Shock Proteins: -

Heat Shock Proteins are the proteins produced by most plants especially plants of temperate regions at 40 °C or above that protect enzymes and other proteins from denaturing due to high temperature.

3. Lithotripsy:

See Gujranwala Board Answer No: 14

4. Dialysis:

See Gujranwala Board Answer No: 7

5. Differences between hypotonic and hypertonic solution: -

See Gujranwala Board Answer No: 8

6. Renal Failure: -

See Exercise Chapter No: 15 Answer No: 5

7. The Role of Hormones in Human Kidney: -

See Multan Board Answer No: 24

8. Dialysis: -

See Gujranwala Board Answer No: 7

9. Non-Shivering Thermogenesis: -

1. Production of heat triggered by hormones is called Non-Shivering Thermogenesis. OR
Production of heat due to rise in rate of basal metabolism by production of hormones is called

Non-

Shivering Thermogenesis.

2. It occurs during persistent cold conditions.

3. To increase the body's metabolic rate quickly, body

secretes the hormone adrenaline from adrenal gland. For long period of time (months), body will increase its metabolic rate by producing thyroxine.

4. Control center for non-shivering thermogenesis lies in the anterior hypothalamus.

10. Differences between Hemodialysis and Peritoneal Dialysis:

Hemodialysis	Peritoneal Dialysis
1. It is done outside the body with artificial kidney, the dialyzer.	1. It is done inside the body.
2. The basic principle of hemodialysis is to pass blood channels bounded by a thin semipermeable membrane in a dialyzer. On the either side of the membrane is a dialyzing fluid into which urea and other wastes in the blood pass by diffusion.	2. Peritoneal membrane is utilized as semipermeable membrane. Dialysis fluid is filled in peritoneal cavity through catheter. Wastes and excess water from the blood vessels lining the peritoneum cavity seep through the peritoneal membrane into the dialyzing fluid in the cavity. The fluid is then changed regularly to repeat the process.

11. Two Adaptations of Plants to High Temperature Conditions: -

1. Plants keep cool by transpiration, the evaporation of water through stomata at the surface of leaves.
2. Plants respond to high temperature by synthesizing Heat Shock Proteins that prevent the denaturation of enzymes and other proteins.

12. Procedure of Hemodialysis: -

Hemodialysis makes use of kidney machine or an artificial kidney. Blood from the patient is temporarily diverted from an artery in the arm through the machine and is then returned to a vein in the arm. Blood in the machine is passed over a semi permeable dialysis membrane, which is surrounded by dialysis fluid. Certain small molecules such as urea and salts pass from the blood into the dialysis fluid through the dialysis membrane. Useful substances such as glucose, amino acids and some salts and water are retained in the blood. It goes on for 6-10 hours and three times in a week.

13. Differences between Cortical and Juxtamedullary Nephrons: -

Cortical Nephrons	Juxtamedullary Nephron
1. These nephrons have glomeruli located in the outer cortex.	1. They have glomeruli that lie in the renal cortex near the medulla.
2. They have relatively small glomeruli.	2. They have large glomeruli.
3. They have short loops of Henle that penetrate only a short distance into	3. They have very long loops of Henle that extend deep into the medulla.

the medulla.	4. They are surrounded by peritubular capillaries as well as vasa recta.
--------------	--

14. Urea Cycle: -

See Lahore Board Answer No: 27

15. Differences between Osmoconformers and Osmoregulators: -

See Exercise Chapter No: 15 Answer No: 1

16. Glomerular Filtrate: -

1. The filtrate appearing in Bowman's capsule is called as glomerular filtrate.

2. It is actually the fluid that is filtered from glomerular

capillaries into Bowman's capsule.

3. It contains numerous useful substances such as glucose, amino acids, salts etc. in aqueous solution.

4. The glomerular filtrate contains all constituents of blood except for the plasma proteins and red blood cells.

17. Differences between Ureotelic and Uricotelic Animals:-

See Lahore Board Answer No: 2

18. Anhydrobiosis: -

Exercise Chapter No: 15 Answer No: 2

19. Flame Cell one Example: -**A) Flame Cell: -**

See Lahore Board Answer No: 30 (A)

B) Example: -

Planaria (Phylum Platyhelminthes)

20. Homeostasis: -

See Lahore Board Answer No: 10

21. Adaptations of Plants to Survive in Heat Stress: -

See Bahawalpur Board Answer No: 11

22. Protonephridium: -

1. A protonephridium is a network of closed tubules without internal opening. However, it opens to the exterior through nephridiopore.

2. It is capped by a cellular set up termed as flame cell.

3. It collects nitrogenous wastes from tissue fluid or interstitial fluid.

4. It usually excretes ammonia.

5. It is found in flatworms.

23. Two Adaptations of Xerophytes for Osmoregulation: -

1. Many xerophytes possess small, thick leaves to limit water loss by reducing surface area proportional to the volume.

2. Their stomata are on lower surface of leaves and are located in depression to reduce water loss.

24. Differences between Osmoconformers and Osmoregulators: -

See Exercise Chapter No: 15 Answer No: 1

FAISALABAD BOARD QUESTIONS

1. Differentiate between Osmoregulation and Thermoregulation. (Faisalabad Board (A) 2008)

2. What is Homeostasis? Give its importance. (Faisalabad Board (A)

2008)

3. Write down structural formulae of urea and uric acid.

(Faisalabad Board (A)

2008)

4. Draw a metabolic pathway in Urea cycle.

(Faisalabad Board (A)

2009)

5. What is Peritoneal dialysis?

(Faisalabad Board (A)

2009)

6. Differentiate ureotely from uricotel.

(Faisalabad Board (A)

2010)

7. What is lithotripsy? (Faisalabad Board (A) 2010)

8. How the marine animals inhabiting cold water regulate their body temperature?

(Faisalabad Board (A)

2010)

9. Sketch the human kidney. (Faisalabad Board (A) 2011)

10. Name two hormones involved in nephron working.

(Faisalabad Board (A)

2011)

11. How marine mammals regulate their body temperature?

(Faisalabad Board (A) 2011)

12. Explain anhydrobiosis with an example.

(Faisalabad Board (A)

2012)

13. What are heat-shock proteins?

(Faisalabad Board (A)

2012)

14. What is the role of aldosterone and antidiuretic hormones in kidney? (Faisalabad Board (A) 2012)

15. Distinguish between hypotonic and hypertonic environment. (Faisalabad Board (A) 2013)

16. What is meant by shivering and non-shivering thermogenesis? (Faisalabad Board (A) 2013)

17. Differentiate between osmoconformers and osmoregulators. (Faisalabad Board (A) 2013)

18. What is pyrexia? How is it caused?

(Faisalabad Board-Old Scheme-2014-

A)

19. Give some characteristics of xerophytes.

(Faisalabad Board-Old Scheme-2014-

A)

20. Define homeostasis.

(Faisalabad Board-New Scheme-2014-

A)

21. What is anhydrobiosis?

(Faisalabad Board-New Scheme-2014-

A)

22. What is counter current multiplier mechanism? (Faisalabad Board-New Scheme-2014-

A)

23. Give structural adaptations for regulation of heat exchange between an animal and environment.

(Faisalabad Board-New Scheme-2015-

A)

24. Differentiate between vasodilation and vasoconstriction.

(Faisalabad Board-New Scheme-2015-

A)

25. What is pyrexia and its importance?

(Faisalabad Board-New Scheme-2015-

A)

Answers

1. Difference between Osmoregulation and Thermoregulation.

See Gujranwala Board Answer No: 2

2. A) Homoestasis: -

See Lahore Board Answer No: 10

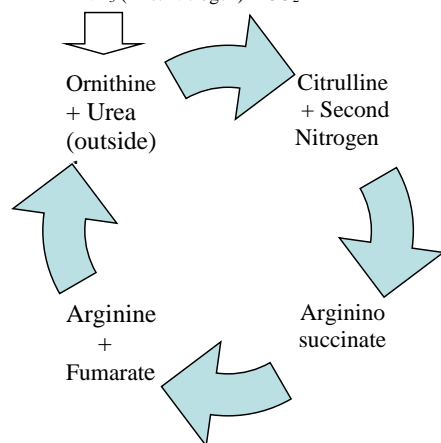
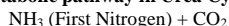
B) Importance of Homeostasis: -

See Lahore Board Answer No: 19

3. Structural Formulae of Urea and Uric Acid: -

See Lahore Board Answer No: 7

4. Metabolic pathway in Urea Cycle: -



5. Peritoneal Dialysis: -

Peritoneal Dialysis work on the same principle as Haemodialysis except that abdomen has a peritoneal cavity lined by a thin epithelium called peritoneum. Peritoneal cavity is filled with dialysis fluid that enters the body through a catheter. Excess water and wastes pass through the peritoneum into the dialysis fluid. This process is repeated several times a day.

6. Differences between ureotely and uricotely.

Ureotely	Uricotely
1. It is the pattern of excreting urea by the animals.	1. It is the pattern in which animals excrete uric acid.
2. It requires more water than uricotely.	2. It requires little water loss, hence conserves more water than ureotely.
3. Synthesis of urea requires less energy expenditure than uric acid synthesis.	3. Synthesis of uric acid requires more energy expenditure than urea synthesis.
4. It is found in mammals, most amphibians, shark and some bony fishes.	4. It is found in birds, insects, many reptiles and land snails.

7. Lithotripsy:

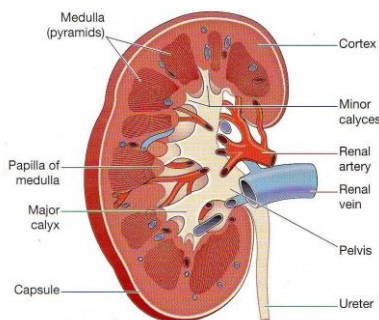
See Gujranwala Board Answer No: 14

8. Regulation of Body Temperature of Marine Animals:

The marine animals inhabiting cold water regulate their body temperature by possessing a very thick layer of adipose tissue called blubber that forms an

active barrier against heat loss.

9. Diagram of Human Kidney: -



A longitudinal section of the right kidney.

10. Names of Hormone involved in Nephron Working:

1. Antidiuretic Hormone (ADH) or Vasopressin secreted by posterior pituitary

2. Aldosterone secreted by adrenal cortex of adrenal gland

11. Regulation of Marine Animals: -

See Faisalabad Board Answer No: 8

12. Anhydrobiosis with an Example: -

See Exercise Chapter No: 15 Answer No: 2

13. Heat-Shock Proteins: -

See Bahawalpur Board Answer No: 2

14. Role of Aldosterone and Antidiuretic Hormones in

Kidney:

See Multan Board Answer No: 24

15. Differences between Hypotonic and Hypertonic Environment: -

See Lahore Board Answer No: 8

16. A) Shivering Thermogenesis: -

1. Production of heat by involuntary contractions of the skeletal muscles is called Shivering Thermogenesis.
2. Control center for shivering thermogenesis is located in the posterior hypothalamus.
3. Posterior hypothalamus is activated when the body temperature falls even a fraction of a degree below a critical temperature level.
4. During shivering thermogenesis first tone of the skeletal muscle is increased and when it rises above a certain critical level the shivering begins.

B) Non-Shivering Thermogenesis:

See Bahawalpur Board Answer No: 9

17. Differences between Osmoconformers and Osmoregulators: -

See Exercise Chapter No: 15 Answer No: 1

18. A) Pyrexia:

Pyrexia or Fever or High Temperature means a body temperature above the normal due to a resetting at a higher level of the thermostat mechanism in the hypothalamus.

B) Cause of Pyrexia: -

Pyrexia occurs when there is an infection. In case of viral and bacterial infections, certain substances called

pyrogens are released from pathogens, leucocytes and degenerating tissues that displace the set point of

hypothalamus above the normal point of 37 °C.

19. Some characteristics of Xerophytes: -

1. They have thick waxy that prevents damage by blowing sand and prevents excessive water loss.
2. Many have small spiny leaves to reduce water loss by

transpiration and stop the plant being eaten by herbivores.

3. They have long deep roots which spread out sideways

to collect all available water.

4. They have stomata in lower depressions of leaves.

20. Homeostasis: -

See Lahore Board Answer No: 10

21. Anhydrobiosis: -

Exercise Chapter No: 15 Answer No: 2

22. Counter Current Multiplier Mechanism: -

The interstitial fluid of kidney is gradually concentrated from cortical to medullary part, thus inner medulla is highly concentrated with the presence

of urea and through a mechanism of counter-current multiplier. This mechanism causes gradual outflow of

water from the filtrate back to kidney as it downward

in the descending loop of Henle. Furthermore, ascending loop of Henle does not allow outflow of water from its filtrate, instead actively transport Na ions into kidney interstitium to sustain its high concentration.

23. Structural Adaptations for Regulation of Heat Exchange: -

1. Long term changes in sub-dermal fatty layer insulation

and pelage

2. Presence of sweat glands

3. Lungs modified for panting Or

1. Modification of lungs for panting in dogs.

2. Sweat (mostly composed of water and salt)

produced

by sweat glands. Sweat is secreted onto the surface of

the skin, where water evaporates using the skin's thermal energy hence cooling the skin.

3. Sub-dermal fat layer (usually a layer of adipose tissue)

is deposited under the dermis of the skin which acts

as

an insulating layer preventing heat from escaping. In aquatic mammals such as seals, whale, the adipose layer is very thick called as blubber which forms an active barrier against heat loss.

4. Pelage

24. Differences between Vasodilation and Vasoconstriction: -

Vasodilation	Vasoconstriction
1. It is expansion of the diameter of blood vessels.	1. It is narrowing of diameter of blood vessels.
2. Vasodilation happens when the arterioles supplying the capillaries in the skin's surface increase in size, resulting an increase blood supply to the surface skin.	2. It occurs when the arteriole supplying blood to the capillaries in the surface layer of the skin constrict, so reducing the flow of blood to the skin's surface.
3. Due to vasodilation, skin capillaries become fill with warm blood and heat radiates from skin surface.	3. Due to vasoconstriction, blood is diverted from skin to deeper tissues and amount of heat lost through the surface is reduced.

25. A) Pyrexia: -

See Lahore Board Answer No: 3

B) Importance of Pyrexia: -

It helps in stimulating the protective mechanisms against the pathogens.

RAWALPINDI BOARD QUESTIONS

1. What are Hydrophytes? (Rawalpindi Board (A) 2010)

2. Differentiate between Osmoconformers and

Osmoregulators. (Rawalpindi Board (A) 2010)

3. Write two storage functions of Liver and effects on homeostasis. (Rawalpindi Board (A) 2010)

4. What are hydrophytes? (Rawalpindi Board (A) 2010)

5. Differentiate between hydrophytes and xerophytes. (Rawalpindi Board (A)

2011)

6. Define excretophores. (Rawalpindi Board (A) 2011)

7. Write about Urea cycle. (Rawalpindi Board (A) 2011)

8. Define homeostasis and anhydrobiosis.

(Rawalpindi Board (A)

2012)

9. Differentiate between metanephridium and protonephridium. (Rawalpindi Board (A) 2012)

10. Define counter-current multiplier.

(Rawalpindi Board (A)

2012)

11. What are ectotherms? Give two examples.

(Rawalpindi Board (A)

2013)

12. Define anhydrobiosis. (Rawalpindi Board (A) 2013)

13. Write down thermoregulatory mechanisms in bats

and

dogs. (Rawalpindi Board (A) 2013)

14. What are Mesophytes? Give examples.

(RawalpindiBoard-New Pattern-2014-

A)

15. Give structure of a protonephridium.

(RawalpindiBoard-New Pattern-2014-

A)

16. Differentiate between osmoconformers and osmoregulators.

(RawalpindiBoard-New Pattern-2014-

A)

17. What is peritoneal dialysis? Explain.

(RawalpindiBoard-New Pattern-2014-

A)

18. Briefly describe urea cycle.

(Rawalpindi Board-New Pattern-2014-

A)

19. Write a note on kidney transplantation.

(Rawalpindi Board-New Pattern-2014-

A)

Answers**1. Hydrophytes: -**

See Multan Board Answer No: 4

2. Differences between Osmoconformers and Osmoregulators: -

See Exercise Chapter No: 15 Answer No: 1

3. A) Two Storage Functions of Liver: -

1. It stores iron.
2. It stores glucose in the form of glycogen.

B) Their Effects on Homeostasis: -

1. Oxygenation of tissues as constituent hemoglobin
2. Energy reserves

4. Hydrophytes: -

See Multan Board Answer No: 4

5. Differences between Hydrophytes and Xerophytes:

See Multan Board Answer No: 19

6. Excretophores: -

See Multan Board Answer No: 20

7. Explanation of Urea Cycle: -

The metabolic pathways involved in the production of urea are termed as Urea Cycle. Two ammonia and one

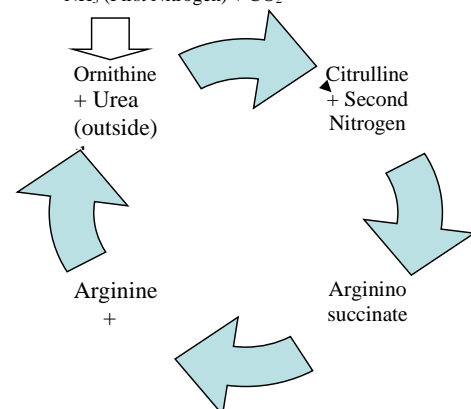
carbon dioxide are shunted into the cycle to generate one molecule of urea. One molecule combines with carbon dioxide and already available precursor from previous cycle ornithine to form citrulline, subsequently another ammonia combines

to form arginine. The arginine is split by arginase to form urea and the precursor ornithine for next cycle. OR Following steps take place in urea cycle.

1. NH_3 and CO_2 unite with Ornithine (already available precursor from previous cycle) to form Citrulline.
2. Citrulline condenses with second source of nitrogen (Aspartate) to form Argininosuccinate in an ATP dependent reaction.
3. Argininosuccinate is hydrolyzed into Arginine and Fumarate.
4. An enzyme Arginase, found only in the liver cells, catalyzes the hydrolysis of Arginine releasing urea and

ornithine. Ornithine continues in the urea cycle while

urea is transported to kidney through blood. The metabolic pathways in urea cycle is represented as:

**8. A) Homoestsis: -**

See Lahore Board Answer No: 10

B) Anhydrobiosis: -

See Exercise Chapter No: 15 Answer No: 2

9. Differences between metanephridium and protonephridium:**10. Counter-current Multiplier: -**

See Faisalabad Board Answer No: 22

11. Ectotherms with Examples: -

1. Their body temperature is mainly the changing temperature of the environment.
2. They use little energy to maintain a high metabolic rate.
3. Their metabolic rate tends to change with the weather.
4. They have very lower daily expenditure.
5. Many ectotherms adjust their body temperature by behavior. For example, lizards take heat by basking

in

the sun. Other behavioral strategies for regulating temperature include hibernation and migration.

Examples:

Amphibians (frogs), reptiles (lizards) etc.

12. Anhydrobiosis: -

Exercise Chapter No: 15 Answer No: 2

13. A) Thermoregulatory Mechanism in Dogs: -

In dogs heat is lost by panting. It greatly speeds up evaporation from lungs along with cooling of blood. Panting also facilitates loss of heat from the blood as

it

flows through the pulmonary capillaries.

B) Thermoregulatory Mechanism in Bats: -

Bats use saliva and urine for evaporative cooling.

15. Mesophytes with Examples: -

See Multan Board Answer No: 22

16. Structure of a Protonephridium: -

A protonephridium is a network of closed tubules without internal openings. Tubular system is spread throughout the body and branches are capped by a cellular set up termed as flame cell. Each flame cell has a tuft of cilia. Tubular system is connected with excretory ducts, which open to the exterior through several nephridiopores.

17. Differences between Osmoconformers and Osmoregulators: -

See Exercise Answer No: 1

17. Peritoneal Dialysis: -

See Faisalabad Answer No: 5

18. Urea Cycle: -

See Rawalpindi Board Answer No: 7

19. A Note on Kidney Transplantation: -

1. Kidney transplantation is a surgical procedure in which matching donor kidney is transplanted to a patient (receptient) with uremia.

2. Dialysis cannot be done in uremia hence the surgical transplantation of matching donor kidney is the only option left for as the permanent treatment.
3. A close relative may volunteer as potential donor.
4. It is successful in 80 % of cases.

SARGODHA BOARD QUESTIONS

1. Define counter current multiplier. Also give its functions. (Sargodha Board (A) 2010)
2. Distinguish between ectotherms and endotherms. (Sargodha Board (A) 2010)
3. Skin does not come within the definition of excretory organ. Comment. (Sargodha Board (A) 2010)
4. Why ammonia is more toxic than other nitrogenous wastes? (Sargodha Board (A) 2011)
5. Describe the role of ADH. (Sargodha Board (A) 2011)
6. What is peritoneal dialysis? (Sargodha Board (A) 2011)
7. Give four adaptations of marine fish for its survival. (Sargodha Board (A) 2012)
8. A) What are juxtamedullary nephrons?
B) What is their role? (Sargodha Board (A) 2012)
9. Define counter current multiplier. (Sargodha Board (A) 2012)
10. Define homeostasis. Give its one importance. (Sargodha Board (A) 2013)
11. Define Poekilotherm. Give its two examples. (Sargodha Board (A) 2013)
12. Differentiate between shivering and non-shivering thermogenesis. (Sargodha Board (A) 2013)
13. Differentiate between ureotelic from uricotelic. (Sargodha Board (New Scheme) 2014-A)
14. What is lithotripsy? Explain (Sargodha Board (New Scheme) 2014-A)

Answers

1. A) Counter Current Multiplier: -

The repetitive re-absorption of sodium chloride by the thick ascending loop of Henle and continued inflow of new sodium chloride from proximal tubule into the loop of Henle is called the Counter Current Multiplier.

B) Functions of Counter Current Multiplier: -

1. It is a main factor for the production of concentrated urine in mammals including humans.
2. It maintains highest concentration of solutes (Na, urea) in the inner medulla.
3. It causes gradual outflow of water from the filtrate back to kidney. Almost 90 % of water of filtrate is reabsorbed.

2. Differences between Ectotherms and Endotherms:

See Lahore Board Answer No: 6

3. Skin Not an Excretory Organ: -

1. Skin does not come within the definition of excretory organ because two main functions performed by skin seem to be of excretory in nature but actually they are not for the purpose of excretion:
 1. The removal of water and salts from the sweat glands (produced by skin) is for the purpose of thermo-regulation.
 2. Production of sebum by the skin is for protection of micro-organism.
4. **Toxicity of Ammonia: -**
Ammonia contains only one nitrogen atom per molecule, so every nitrogen is equivalent to an osmotic particle that requires for excretion (i.e. 500 ml for 1 g), so it is very toxic and extremely soluble in body fluids.

5. Role of ADH: -

See Lahore Board Answer No: 21 (B)

6. Peritoneal Dialysis: -

See Faisalabad Answer No: 5

7. Four Adaptations of Marine Fish for its Survival: -

1. It keeps its body fluids isotonic to external sea water (e.g. hogfish).
2. It accumulates and tolerates urea in its blood. It also accumulates trimethylamine oxide for protection against urea (e.g. shark).
3. It drinks sea water in order to compensate water loss from its hypotonic body fluids (e.g. bony marine fish).
4. It actively excretes excess salts by gills, kidneys or by rectal glands (e.g. bony or cartilaginous marine fish)

8. A) Juxtamedullary Nephrons: -

1. Nephrons with their tubular system looping in the deep medulla are known as Juxtamedullary Nephrons.
2. They have glomeruli that lie in the renal cortex near the medulla.
3. They have large glomeruli.
4. They have very long loops of Henle that extend deep into the medulla.
5. They are surrounded by peritubular capillaries derived from efferent arterioles. For the juxtamedullary nephrons long efferent arterioles extend downward into the medulla and then divide into specialized peritubular capillaries called vasa recta that extend downward into the medulla laying side by side with the loop of Henley.
6. About 20 to 30 percent of the nephrons are juxtamedullary nephrons.

B) Role of Juxtamedullary Nephron:

Juxtamedullary nephrons contribute to the ability of the mammalian kidney to concentrate urine.

9. Counter Current Multiplier:

1. The repetitive re-absorption of sodium chloride by the thick ascending loop of Henle and continued inflow of new sodium chloride from proximal tubule into the loop of Henle is called the Counter Current Multiplier.

2. The interstitial fluid or interstitium of kidney is gradually concentrated from cortical to medullary part through Counter Current Multiplier which is completed in the following steps.
- a. During the passage of isotonic filtrate through the descending limb of Henle, passive uptake of water turns the filtrate gradually hypertonic to the tissue fluid.
- b. Subsequently, in the ascending limb, the sodium and chloride ions are actively removed from the filtrate, thus turning it into hypotonic.
- c. The sodium and chloride ions removed from the ascending limb slowly diffuse back into descending limb maintaining highest concentration of solutes in the inner medulla.

10. A) Homeostasis: -

See Lahore Board Answer No: 10

B) Importance of Homeostasis: -

See Lahore Board Answer No: 19

11. Poikilotherms with Two

Examples: -

12. Differences between Shivering Thermogenesis and Non-Shivering Thermogenesis:

See Multan Board Answer No: 11

13. Ureotely different from Uricotely: -

See Faisalabad Board Answer No:6

14. Lithotripsy: -

See Faisalabad Board Answer No: 14

DERA GHAZI KHAN BOARD QUESTIONS

1. How much water is required to remove one gram of Ammonia? (Dera Ghazi Khan Board (A) 2009)
2. How marine fish differ from freshwater fish? (Dera Ghazi Khan Board (A) 2009)
3. Differentiate between cortical nephron and juxtamedullary nephron. (Dera Ghazi Khan Board (A) 2010)
4. What are heterotherms? Give example. (Dera Ghazi Khan Board (A) 2010)
5. How does brown fat help mammals in thermoregulation? Differentiate brown fat from blubber. (Dera Ghazi Khan Board (A) 2010)
6. Compare cortical nephron with juxtamedullary nephron. (Dera Ghazi Khan Board (A) 2011)
7. Define Anhydrobiosis with an example. (Dera Ghazi Khan Board (A) 2011)
8. Differentiate between osmoconformers and osmoregulators. (Dera Ghazi Khan Board Group I 2012)
9. What are xerophytes? Give their examples.

(Dera Ghazi Khan Board Group I

2012)

10. How shivering thermogenesis is caused?

(Dera Ghazi Khan Board Group II

2012)

11. What do you know about renal failure?

(Dera Ghazi Khan Board Group II

2012)

12. Draw a metabolic pathway in urea cycle.

(Dera Ghazi Khan Board Group I

2013)

13. Differentiate osmoregulation from thermoregulation.

(Dera Ghazi Khan Board Group I

2013)

14. What do you know about pyrexia?

(Dera Ghazi Khan Board Group I

2013)

15. Differentiate between cortical nephron and juxtamedullary nephron.

(Dera Ghazi Khan Board Group II

2013)

16. Why leaves are called excretophores?

(Dera Ghazi Khan Board Group II

2013)

17. What are pyrogens? Give their function.

(Dera Ghazi Khan Board Group II

2013)

18. What are heterotherms? Give example.

D.G.K. Board (New Course) Group-I (2014-

A)

19. Give structural formulae of Urea and Uric acid.

(D.G.K. Board (New Course) Group-I (2014-

A)

20. Why leaves are said to be excretophores?

(D.G.K. Board (New Course) Group-I (2014-

A)

21. Write four osmoregulatory adaptations in xerophytes.

(D.G.K. Board (New Course) Group-II (2014-

A)

22. What are different metabolic wastes in human?

(D.G.K. Board (New Course) Group-II (2014-

A)

23. Define pyrexia and pyrogens.

(D.G.K. Board (New Course) Group-II (2014-

A)

24. Differentiate between osmoregulation and thermoregulation.

(D.G.K. Board-New Course-Group-I-2015-

A)

25. What do you about excretophore?

(D.G.K Board-New Course-Group-I-2015-

A)

26. Give the special features of Malpighian tubules.

(D.G.K Board-New Course-Group-I-2015-

A)

27. Differentiate between osmoconformers and osmoregulators.

(D.G.K Board-New Course-Group-II-2015-

A)

28. Differentiate between endotherms and ectotherms.

(D.G.K Board-New Course-Group-II-2015-

A)

29. Define anhydrobiosis, give an example.

(D.G.K Board-New Course-Group-II-2015-

A)

Answers**1. Water Requirement for Excretion of Ammonia: -**

About 500 ml water is required to excrete one gram of

Ammonia.

2. Differences between Marine Fish Freshwater**Fish:**

Marine Fish	Freshwater Fish
1. It drinks sea water.	1. It does not drink freshwater.
2. It loses water through gills and skin by osmosis.	2. It gains water by osmosis through body surface and gills.
3. It gains salts by diffusion.	3. It loses salts by diffusion.
4. It excrete salts actively by gills, kidney or by rectal glands.	4. It gains salts actively by gills or by eating salty food.
5. It produces small amount of isotonic urine.	5. It produces large volume of hypotonic urine.
6. It has kidneys with small or no glomeruli.	6. It has kidneys with large glomeruli.

3. Differences between Cortical and**Juxtamedullary****Nephrons:**

See Bahawalpur Board Answer No: 13

4. Heterotherms with Example: -

Heterotherms are the animals that generate heat of varying degree so their body temperature is kept in a wide range.

Examples: Bats, Humming birds etc.

Or These animals are capable of varying degree of endothermic heat production but generally do not regulate their body temperature within a narrow range.

Examples: Bats, humming birds etc.**5. A) Role of Brown Fat in Thermoregulation: -**

Brown fat, in contrast to ordinary white fat, has a large

number mitochondria. It has an exceptionally high metabolic rate. It is found in many mammals in patches in various parts of the body, particularly between the shoulder blades. Its function is to

produce heat, especially in hibernators as they come out of hibernation. Brown fat is also found in humans and

is particularly important in babies, whose temperature regulating mechanisms have not been developed.

B) Brown Fat different from Blubber: -

Brown Fat	Blubber
1. It is brown in color due to large number of mitochondria found in brown adipose tissue cells.	1. It is a white fat found in adipose tissue cells.
2. It is found in patches in various parts of the body, particularly between the	2. It is a very thick layer of fat beneath the skin.
	3. It is found in marine mammals living in colder water such as whale, seals,

shoulder blades.

3. It is found in some cold adapted animals, hibernating animals and newborn animals including human babies.

dolphins etc.

6. Comparison of Cortical Nephron with Juxtamedullary Nephron:

See Bahawalpur Board Answer No: 13

7. Anhydrobiosis with an Example:

Exercise Chapter No: 15 Answer No: 2

8. Differences between osmoconformers and osmoregulators: -

See Exercise Chapter No: 15 Answer No: 1

9. Xerophytes with Examples: -

1. The plants living in dry places such as deserts, steep hills are called Xerophytes.

2. They have adaptations for reduced rate of respiration.

a. Many xerophytes possess small, thick leaves to limit water loss by reducing surface area proportional to the volume.

b. Their cuticle is thick, waxy and leathery.

c. Stomata are on lower surface of leaves and located in

depression.

d. Some, as cacti, during the driest season, shed their leaves to restrict completely.

3. They also have following adaptations to conserve water.

a. Their stems store water in rainy season for use in dry conditions.

b. Some plants such as cacti have superficial, horizontal roots which can absorb water before it evaporates from the soil.

10. How Shivering Thermogenesis Caused: -

Located in posterior thalamus is an area called

motor center for shivering. When the body temperature

falls

even a fraction of degree below a critical

temperature, it transmits signals. These signals do not cause the actual muscle shaking, instead they increase the tone of the skeletal muscles. When the tone rises above a certain critical level, shivering begins.

11. Renal Failure: -

See Exercise Chapter No: 15 Answer No: 5

12. Metabolic Pathway in Urea Cycle: -

See Faisalabad Board Answer No: 4

13. Difference between Osmoregulation and Thermoregulation.

See Gujranwala Board Answer No: 2

14. Pyrexia: -

1. Pyrexia or Fever or High Temperature means a body temperature above the normal due to a resetting at a higher level of the thermostat mechanism in the hypothalamus.

2. During bacterial and viral infections, substances called

pyrogens are produced from infecting organisms

(pathogens) and leucocytes (which increase in number due to infection) that displace the set point of hypothalamus above the normal point of 37 °C. Within a few hours after the set point has been increased to a higher level, the body temperature also approaches this level.

15. Differences between Cortical and Juxtamedullary

Nephrons: -

See Bahawalpur Board Answer No: 13

16. Leaves as Excretophore: -

See Lahore Board Answer No: 12

17. A) Pyrogens: -

These are the substances that are released from toxic bacteria or from degenerating tissues of the body or from leukocytes. OR

Many proteins, breakdown products of protein, and certain other substances, especially lipopolysaccharide toxins released from bacterial cell membranes, are called Pyrogens.

B) Function of Pyrogens: -

Their function is to displace the set point of hypothalamus above the normal point of 37 °C.

Or

They are carried by the blood to the brain and direct neurons in the hypothalamus to raise the body's temperature several degree above the normal value

of

37 °C (98.6 °F). OR

They cause fever.

18. Heterotherms with Example: -

See D.G.K. Board Answer No: 4

19. Structural Formulae of Urea and Uric acid: -

See Lahore Board Answer No: 7

20. Leaves said to be Excretophores: -

See Lahore Board Answer No: 12

21. Four Osmoregulatory Adaptations in Xerophytes:

1. Small, thick leaves with less area proportional to the volume
2. Thick, waxy and leathery cuticle
3. Stomata on lower surface of leaves in depressions
4. Storage of water by stem for use in dry seasons

22. Different Metabolic Wastes in Human: -

1. Urea --- Produced from the metabolism of amino acids
2. Uric acid --- Produced from the the metabolism of nucleic acids
3. Creatinine --- Produced from metabolism of muscle creatine
4. Bilirubin ---- End products of hemoglobin breakdown
5. Metabolites of various hormones
6. Pesticides, drugs and food additives

23. A) Pyrexia: -

See Lahore Board Answer No: 3

B) Pyrogens: -

See D.G.K. Board Answer No: 17 (A)

24. Differences between Osmoregulation and Thermoregulation: -

See Gujranwala Board Answer No: 2

25. Excretophore: -

See Multan Board Answer No: 20

26. Special Features of Malpighian Tubules: -

Malpighian tubules are the only excretory structures in animal kingdom that are associated with digestive tract. They remove nitrogenous waste from hemolymph and pour them in the gut to be excreted out along with feces.

27. Differences between Osmoconformers and Osmoregulators: -

See Exercise Chapter No: 15 Answer No: 1

28. Differences between Endotherms and Ectotherms:

See Lahore Board Answer No: 6

29. Anhydrobiosis With An Example: -

See Exercise Chapter No: 15 Answer No: 2

SAHIWAL BOARD QUESTIONS

1. How do bony fishes osmoregulate in marine environment? (Sahiwal Board (A) 2013)
2. What is uricotel? Give examples. (Sahiwal Board (A) 2013)
3. What is hyperoxaluria? How is it caused? (Sahiwal Board (A) 2013)
4. What is pyrexia? (Sahiwal Board (New Scheme) (A) 2014)
5. Give the structural formula of uric acid. (Sahiwal Board (New Scheme) (A) 2014)
6. Draw and labeled single flame cell of planaria. (Sahiwal Board (New Scheme) (A) 2014)
7. Draw and label human kidney. (Sahiwal Board-New Scheme-2015-A)
8. Give adaptations in plants to manage high temperature. (Sahiwal Board-New Scheme-2015-A)
9. How marine mammals adapted to live in cold water? (Sahiwal Board-New Scheme-2015-A)

Answers

1. Osmoregulation of Bony Fishes in Marine Environment: -

1. They drink sea water in order to compensate water loss from their body fluids due to hypertonic external environment.
 2. They actively excrete salts (gained by drinking sea water and by diffusion across skin and gills) by gills, by rectal glands or by kidney.
- 2. Uricotel with Examples: -**
1. It is the pattern in which animals excrete uric acid.
 2. Uric acid contains four nitrogen atoms per molecule, so its excretion i.e. uricotel requires little water hence conserves more water.
 3. Synthesis of uric acid requires more energy expenditure than ammonia and urea synthesis.

4. Uricotelous is an adaptive advantage for species whose young begin their development enclosed in eggs.
4. It is found in birds, insects, many reptiles and land snails.
- 3. A) Hyperoxaluria**
1. It is the abnormally high level of oxalate in urine.
2. Oxalate is an end product of body metabolism and is present naturally in the urine. Its higher level in blood as well as in urine (i.e. Hyper-oxalurea) promotes stone formation.
- B) Cause of Hyperoxaluria: -**
- It is caused due to a diet containing food or drinks with a high content of oxalate
- 4. Pyrexia: -**
- See Lahore Board Answer No: 3
- 5. Structural formula of Uric Acid: -**
- See Lahore Board Answer No: 7 (b)
- 6. Labeled Diagram of Flame Cell: -**

- 7. Labeled Diagram of Human Kidney: -**
- See Faisalabad Board Answer No: 9
- 8. Adaptations in plants to Manage High Temperature: -**
- See Gujranwala Board Answer No: 5
- 9. Adaptation of Marine Mammals to Live in Cold Water: -**
- Marine mammals have adapted to live in cold water by having a very thick layer of insulating fat called as blubber just under the skin.

C h a p t e r ---- 16

SPORTS AND MOVEMENTS

3SQs

I) From Exercise:-

Questions

- What is the cause of cramps?
- What is the difference between tetanus and muscle tetany?
- What is a ligament?
- What is "nutration"?
- How many ribs do not attach with sternum?
- How rickets are produced?
- What is the cause of tetanus?
- How muscle fatigue is produced?
- Distinguish between the following:
 - Axial skeleton and appendicular skeleton

- Phototactic and chemotactic stimulus
- Osteocytes and osteoblasts
- Brachialis and brachioradialis
- Origin and insertion of muscles
- Bone and cartilage
- Troponin and tropomyosin

Answers

1. Cause of Cramp: -

It is caused due to low blood sugar level, electrolyte depletion, dehydration, and irritability of spinal cord and neurons.

OR

Cramps are caused by spinal cord reflexes which are produced due to low blood sugar level, electrolyte depletion and dehydration.

2. Difference between Tetanus and Muscle Tetany: -

Tetanus	Tetany
1. It is an acute infectious disease.	1. It is not an infectious disease.
2. It is caused by exotoxins produced by a Gram positive anaerobic bacterium, <i>Clostridium tetani</i> .	2. It is caused by low level of calcium in the blood.
3. The exotoxin produced by bacteria influences neuromuscular activity and causes paroxysmal muscular spasm which becomes more severe and is fatal in many cases.	3. Low level of calcium in the blood excites the neurons which triggers muscle twitching rapidly leading to convulsion and death in case of respiratory organs.

3. Ligament: -

- A ligament is a cord or band of fibrous connective tissue uniting two bones.
- It is commonly found in association with joints.
- It is elastic in nature.
- It stretches to allow limited movement at joints.

4. Nutation: -

- It is a type of growth movement.
- It is a kind of autonomic movement.
- It occurs when apex of young stem grows in a zigzag manner due to an alternate change in the growth rate on opposite side of the apex.
- Movement of climber around the rope is an example.

5. Number of Ribs not Attached with Sternum: -

Two ribs do not attach with sternum.

6. How Rickets Produced: -

Rickets are produced when, due to deficiency of vitamin D and consequently calcium deficit, old bones are absorbed and new un-calcified weak bones take their place resulting in bowing of legs and deformation of pelvis.

7. Cause of Tetanus: -

The cause of tetanus is the powerful exotoxin secreted by a Gram positive bacillus, *Clostridium tetani*.

8. How Muscle Fatigue Produced: -

During heavy or prolonged exercise when enough

oxygen is not available muscle cells receive supply of ATP through anaerobic breakdown of glucose.

During this process glucose is converted into lactic acid. Accumulation of lactic acid (lactate) in the muscle is poisonous and in high concentration dangerous. It causes muscle pH to drop and the muscles to ache. Hence the person feels a pain which produces the tiring condition of the muscle known as muscle fatigue.

9. Differences Between:

a. Axial skeleton and Appendicular Skeleton: -

Axial Skeleton	Appendicular Skeleton
1. It forms the axis of the body or it is located along the central axis of the body.	1. It forms a system of levers to provide mobility to the body.
2. The axial skeleton includes the skull, the vertebrae, the ribs and the sternum.	2. Appendicular skeleton includes the limbs and pectoral and pelvic girdles that attach them to the axial skeleton.
3. It supports and protects the organs of head, neck and chest.	3. The pectoral girdle and upper limbs are specialized for flexibility while pelvic girdle and lower limbs are specialized for strength.
4. A total of 80 bones make up the axial skeleton in humans.	4. A total of 120 bones make up the appendicular skeleton in humans.

b. Phototactic and Chemotactic Movements: -

Phototactic Movement	Chemotactic Movement
1. Stimulus is light.	1. Stimulus is chemical.
2. Passive movement of chloroplasts due to cyclosis in order to absorb maximum light for CO ₂ fixation, is an example of phototactic movement.	2. Movements of sperms of liver-worts, mosses and ferns towards archegonia in response to stimulus of nucleic acids released by ovum is an example of chemotactic movement.

c. Osteocytes and Osteoblasts: -

Osteocytes	Osteoblasts
1. They are mature bone cells.	1. They are bone forming cells.
2. They are the entrapped osteoblasts within the bony matrix deposited by themselves.	2. They are actively moving bone cells which are formed from stem cells.
3. They do not perform the active bone forming-duty. However they are involved in the hormonally regulated exchange of calcium between bone and the blood.	3. They are involved in active bone forming duty such as secretion of spongin matrix, deposition of calcium phosphate in the matrix, etc.

d. Brachialis and Brachioradialis: -

Brachialis	Brachioradialis
1. It is originated from the front of lower half of the humerus.	1. It is originated from the lateral supracondylar ridge of humerus.
2. It is inserted into the ulna.	2. It is inserted into the radius.
3. It is a strong flexor of	3. It flexes fore arm at

the elbow joint.	elbow joint; rotates fore arm to the mid prone position.
------------------	--

e. Differences between Origin and Insertion of Muscles: -

Origin	Insertion
It is the end of muscle which remains fixed when muscle contracts.	It is the end of muscle that moves the bone.

f. Differences between a Bone and Cartilage: -

Bone	Cartilage
1. It is most rigid form of connective tissue.	1. It is the soft and flexible form of connective tissue.
2. Bone is highly vascular tissue.	2. No blood vessel penetrates in to the cartilage.
3. Bone has three types of cells i.e. Osteoblast, Osteocyte, and Osteoclast.	3. The living cells of cartilage are called Chondrocytes.
4. The main protein in the matrix is collagen which is hardened by calcium phosphate.	4. Collagen is not hardened by calcium phosphate.

g. Differences between Troponin and Tropomyosin: -

Troponin	Tropomyosin
1. It is a trimer composed of three polypeptide subunits.	1. It is rod shaped dimer consisting of two polypeptide chains.
2. Troponin binds at a specific site on each tropomyosin dimer and is repeated at 40 nm intervals along each tropomyosin strand.	2. Subunits of tropomyosin coil around each other to form a helix.

II) From Punjab Boards:-

LAHORE BOARD QUESTIONS

- How do sleep movements in plant take place?
(Lahore Board (2008-A))
- Differentiate between photo-tactic movements and phototropism.
(Lahore Board (2008-A))
- What is herniation of disc? (Lahore Board (2008-A))
- What is sciatica and its causes?
(Lahore Board (2009-A))
- How digitigrades differ from unguligrades?
(Lahore Board (2009-A))
- What is difference between tendon and ligament?
(Lahore Board (2009-A))
- What are galls and calluses? (Lahore Board (2009-A))
- What is herniation of disc? (Lahore Board (2010-A))
- Differentiate between passive flight and active flight.
(Lahore Board (2010-A))

10. Explain hematoma formation. (Lahore Board (2010-A))
11. Characterize the collenchyma cells.
(Lahore Board (2011-A))
12. Give two roles of vascular cambium.
(Lahore Board (2011-A))
13. What are the causes of herniation of discs?
(Lahore Board (2011-A))
14. Characterize collenchyma cells.
(Lahore Board Group I (2012-A))
15. What is axial skeleton?
(Lahore Board Group I (2012-A))
16. Define the process of ecdysis.
(Lahore Board Group I (2012-A))
17. What is the roles of vascular cambium?
(Lahore Board Group II (2012-A))
18. Write about two types of Nastic movement.
(Lahore Board Group II (2012-A))
19. Differentiate between passive flight and active flight.
(Lahore Board Group II (2012-A))
20. Discuss two main types of cartilage.
(Lahore Board Group I (2013-A))
21. Differentiate between passive flight and active flight.
(Lahore Board Group I (2013-A))
22. What is Rickets? Give its causes and cure.
(Lahore Board Group I (2013-A))
23. Explain two types of Nastic movement.
(Lahore Board Group II (2013-A))
24. What is herniation of disc?
(Lahore Board Group II (2013-A))
25. Differentiate between fibers and sclereides.
(Lahore Board (Academic session 2010-2013) Group II (2014-A))
26. Explain haptanastic movements by giving an example.
(Lahore Board (Academic session 2010-2013) Group II (2014-A))
27. Name the types of cells associated with bones.
(Lahore Board (Academic session 2010-2013) Group II (2014-A))
28. How callus is formed?
(Lahore Board (Academic session 2012-2014) Group I (2014-A))
29. What is synovial joint?
(Lahore Board (Academic session 2012-2014) Group I (2014-A))
30. What are sources of energy for muscle contraction?
(Lahore Board (Academic session 2012-2014) Group I (2014-A))
31. Differentiate between fibers and sclereides.

- (Lahore Board (Academic session 2012-2014) Group II (2014-A))
32. Explain haptanastic movements by giving an example.
(Lahore Board (Academic session 2012-2014) Group II (2014-A))
 33. Name the types of cells associated with bones.
(Lahore Board (Academic session 2012-2014) Group II (2014-A))

Answers

1. Occurring of Sleep Movements in Plant: -

1. Bean leaves are horizontal during the day when their pulvini are turgid, but become more or less vertical at night as pulvini loose turgor.
2. These sleep movements reduce water loss from transpiration during the night, but maximize photosynthetic during the day.

2. Differences between Photo-tactic Movements and Phototropism: -

Photo-tactic Movement	Phototropism
1. It is movement of locomotion caused by light.	1. It is a curvature movement of a part of plant caused by light.
2. It is not a growth movement.	2. It is a typical growth movement which is brought about by unequal growth on the opposite side of the stimulated organ.
3. Intensity and direction of light both effect this type of movement.	3. Only direction of source of light effects this type of movement.
4. Auxin has no role in this kind of movement.	4. Distribution of auxin plays an important role in phototropism.
5. It is a kind of autonomic movement.	5. It is a kind of paratonic movement.
6. Passive movement of chloroplasts due to cyclosis towards light to absorb maximum light for carbon dioxide fixation is an example of photo-tactic movement.	6. Shoot shows positive phototropism by growing towards light while root shows negative phototropism by growing away from light.

3. Herniation of Disc: -

1. Herniation of Disc is the reapture of annulus fibrosus followed by protrusion of the spongy nucleus pulposus.
2. If protrusion presses spinal cord and spinal nerves, it generates severe pain and even destruction of these nervous structures.
3. It is also known as Disc slip.
4. The discs involved in herniation are called herniated discs or more commonly slipped discs.
5. Severe or sudden trauma to spines, for example, from bending forward while lifting a heavy object, may result in herniation of one or more discs.
6. It is treated with bed rest, traction and painkiller. If this fails disc may be removed surgically.

4. A) Sciatica: -

1. Sciatica is characterized by stabbing pain radiating over the course of sciatic nerve. It may be result in a

number of lower limb impairment depending upon the precise root injured. When sciatic nerve is completely transected, legs become nearly useless and the cannot be flexed and all-foot ankle movement is lost. Recovery from sciatic injury is usually slow and often not complete.

B) Causes of Sciatica: -

Sciatica results due to injury of proximal sciatic nerve

which might follow a fall, a herniated disc, or improper administration of an injection into the buttock.

5. Digitigrades different from Unguligrades: -

Digitigrades	Unguligrades
1. These mammals walk on their digits only.	1. They walk on the tips of toes.
2. First digit is usually reduced or completely lost.	2. Tips of toes are usually modified into hoof.
3. They run slower than unguligrade animals.	3. They run faster than digitigrade animals.
4. Rabbit, rodents etc. are the examples.	4. Deer, goat etc. are the examples.

6. Differences between Tendon and Ligament: -

Ligament	Tendon
1. It attaches bone to bone.	1. It attaches muscle to bone.
2. It is a dense regular tissue which consists of yellow branched elastic fibers made up of elastin protein.	2. It is also a dense regular tissue which consists of un-branched white collagen fibers made up of collagen protein.
3. It is elastic in nature.	3. It is non-elastic.
4. It stretches to allow movement.	4. It does not stretch, so the pull of the muscle is transmitted directly to the bone.

7. A) Galls: -

Galls are growths on plants that are induced by parasites and bacteria.

B) Calluses: -

Calluses are masses of amorphous material with very poor differentiation on the wound of a plant.

8. Herniation of Disc: -

See Lahore Boar Answer No: 3

9. Differences between Passive flight and Active flight: -

Passive flight	Active flight
1. It is commonly known as gliding flight.	1. It is commonly known as flapping flight.
2. It is unpowered flight.	2. It is powered flight.
3. Muscular involvement of wing is limited.	3. Strong muscular contraction is needed to power wing movements.
4. It is relatively a simple flight.	4. It is much more complex than gliding flight.
5. In passive flight the wings are outstretched and held motionless relative to the body.	5. In active flight birds constantly flap the wings.

6. In passive flight, birds constantly use upward air currents for gaining height.
7. Long narrow wings like those of gulls and other sea bird are ideal for passive flight.

6. In circumstances when little or no support can be gained from upward air currents, the same effect can be achieved by flapping the wings (active flight) which creates an air flow over them that uplifts the bird.
7. Short broad wing like those of many garden birds are effective for active flight.

10. Hematoma Formation: -

It is a mass of clotted blood formed at the fracture site

due to fracture of bone and tearing of blood vessels

in

the bone itself or surrounding tissues resulting hemorrhage. Soon after, bone cell deprived of food begin to die and the tissue at the fracture site

becomes

swollen and hence painful.

11. Collenchyma Cells: -

1. Collenchyma cells have protoplasts.
2. They usually lack secondary walls.
3. They have angular thickening in their primary walls.
4. They are elastic.
5. They are usually grouped in strands or cylinders.
6. Young stems often have a cylinder of collenchyma just below their surface.
7. They elongate with the growth of stems and leaves.
8. They provide support to young herbaceous parts of the plant.

12. Two Roles of Vascular Cambium: -

1. It is responsible for the secondary growth.
2. It forms callus or wood tissue on or around the wound.

13. Causes of Herniation of Disc: -

1. Injury to back due to traffic accident, falling etc.
2. Bending forward while lifting a heavy object

14. Collenchyma Cells: -

See Lahore Board Answer No: 11

15. Axial Skeleton: -

1. It forms the axis of the body or it is located along the central axis of the body.
2. It supports and protects the organs of head, neck and chest.
3. The axial skeleton's bones include the bones of skull, the vertebrae, the bones of ribs and the sternum.
4. A total of 80 bones make up the axial skeleton in humans.

16. Definition of the Process of Ecdysis: -

1. The periodic shedding of exoskeleton for growth is known as the process of Ecdysis. OR The process in which arthropods shed exoskeleton periodically and replace it with one of the larger size is called Ecdysis.
2. It is also known as Molting.

3. It leaves the arthropods temporarily vulnerable to predators.
4. It occurs many times until the animal grows to its adult size.

17. Role of Vascular Cambium: -

1. It is responsible for the secondary growth.
2. It forms callus or wood tissue on or around the wound.

18. Two Types of Nastic Movement: -

1. Nyctinasty Movement
2. Haptonastic Movement

19. Differences between Passive flight and Active flight: -

See Lahore Board Answer No: 9

20. Two Main Types of Cartilage: -**A) Hyaline cartilage:-**

1. It is the most common type of cartilage.
2. It is the most abundant type in human body.
3. It has high proportions of amorphous matrix with small amount of collagen fibers.
4. It is found at the movable joints.

B) Fibrocartilage: -

1. It has many bundles of collagen fibers embedded in a

small amount of matrix.

2. It is very flexible.
3. It forms external pinnae of ears and the epiglottis.

21. Differences between Passive flight and Active flight: -

See Lahore Board Answer No: 9

22. A) Rickets: -

It is a disease in children in which bones are soft and deformed. It deforms pelvis and legs in children. The legs of the affected child become incapable of bearing the weight of his body and become bowed.

B) Causes of Rickets: -

It results from calcium or phosphates deficiency in the extracellular fluid, usually caused by lack of vitamin D. Children who remain indoors through the winter in general do not receive adequate quantities of vitamin D without supplementation in the diet.

C) Cure of Rickets: -

It is treated by vitamin D fortified milk and exposing skin to sunlight to cure disorder.

23. Two Types of Nastic Movement: -

See Lahore Board Answer No: 18

24. Herniation of Disc: -

See Lahore Board Answer No: 3

25. Differences between Fibers and Sclereides: -

Fibers	Sclereides
1. They are long tapered cells.	1. They are not elongated. They are more varied in shape.
2. They are usually grouped together in strands and occur as solid bundles or bundle caps.	2. They may occur singly or in groups.
	3. They are found in seed

3. They are particularly abundant in the wood (xylem), inner bark, and leaf ribs (veins) of flowering plants.
4. They give support and provide strength. They provide flexibility to the stem and leaves.

- coats and nut shells.
4. They play a role of protection as much as support. The hardness of the nuts and seed coats is due to sclereids. They also give pears and other fruits their gritty texture.

26. Haptonastic Movements: -

1. It occurs in response to contact.
2. It is a growth movement. Changes in the turgor pressure are also involved
3. In haptonastic movement the direction of the growth response is the same regardless the direction of the signal.
4. It is observed in many insectivorous plants.
5. In this movement an object (any insect) touches the plant part.
6. A Venus's fly trap (*Dionaea muscipula*) has three trichomes (hairs) at the base of the trap. When these are touched by an insect a stimulus brings about closing of the trap. This is due to enlargement of outer cells (growth) of trap.

27. Names of the Cells associated with Bone: -

1. Osteoblasts --- Bone forming cells
2. Osteocytes ---- Mature bone cells
3. Osteoclasts ---- Bone dissolving cells

28. Formation of Callus: -**a. Incase of injury of Plants: -**

When the plant is wounded, surrounding well differentiated tissues are invaded into the wounded area and develop into a mass of amorphous material with very poor differentiation called callus.

b. Incase of Fracture of Bone: -

After clearance of debris of hematoma by inflammatory reactions, fibroblasts and osteoblasts migrate into the fracture site and begin to construct soft callus of the bone. It begins to form in 3-4 weeks.

29. Synovial Joint: -

1. Synovial joints contain a cavity filled with fluid.
2. These joints are adapted to reduce friction between the moving joints.
3. These joints are surrounded by a layer of connective tissue called fibrous capsule which is lined internally by synovial membrane.
4. Some parts of capsule may be modified to form distinct ligament, holding the bones together.
5. Based on structure and movements allowed, synovial joints can be classified into:

- a. Hinge joint
- b. Ball and socket joint.

30. Sources of Energy for Muscle Contraction: -

1. ATP obtained by aerobic breakdown of glucose.
2. ATP obtained from anaerobic breakdown of glucose
3. Creatin phosphate

31. Differences between Fibers and Sclereides: -

See Lahore Board Answer No: 25

32. Haptonastic Movements with an Example: -

See Lahore Board Answer No: 26

33. Names of the Types of Cells Associated with Bones:

See Lahore Board Answer No: 26

GUJRANWALA BOARD QUESTIONS

1. How muscle fatigue is produced?
(Gujranwala Board (2008-A))
2. What is passive flight? (Gujranwala Board (2008-A))
3. What is the cause of tetanus?
(Gujranwala Board (2009-A))
4. What is secondary growth?
(Gujranwala Board (2009-A))
5. Explain the role of exoskeleton in arthropods.
(Gujranwala Board (2010-A))
6. What are the characteristics of smooth muscles?
(Gujranwala Board (2010-A))
7. Differentiate between epinasty and hyponasty.
(Gujranwala Board (2010-A))
8. What is cartilage? (Gujranwala Board (2011-A))
9. What do you know about rickets?
(Gujranwala Board (2011-A))
10. What is turgor pressure?
(Gujranwala Board (2011-A))
11. Explain hematoma formation.
(Gujranwala Board (2012-A))
12. What is herniation of disc?(Gujranwala Board (2012-A))
13. What is the difference between tetanus and muscular tetany? (Gujranwala Board (2012-A))
14. Define geotropism. (Gujranwala Board (2013-A))
15. Differentiate between hyaline cartilage and fibro cartilage. (Gujranwala Board (2013-A))
16. What are calluses? (Gujranwala Board (2013-A))
17. Differentiate between primary and secondary growth
in plants. (Gujranwala Board (2013-A))
18. Write two differences between sclerenchyma and collenchyma cells.
(Gujranwala Board (New Course) 2014-A)
19. Differentiate between hyaline and fibro-cartilage.
(Gujranwala Board (New Course) 2014-A)
20. What is antagonistic action of muscles?
(Gujranwala Board (New Course) 2014-A)
21. Differentiate between photonasty and thermonasty.
(Gujranwala Board-New Scheme-2015-A)
22. Name unpaired bones of cranium. ◀
(Gujranwala Board-New Scheme-2015-A)
23. What is "Ball and Socket Joint"?

(Gujranwala. Board-New Scheme-2015-

A)

Answers**1. How Muscle Fatigue Produced: -**

See Exercise Answer No: 8

2. Passive Flight: -

In passive flight birds glide. When birds glide, the wing act as aero-foils. An airo-foil is any smooth surface which moves through the air at an angle to the airstream. The air flows over the wing in such a way that the bird is given lift, the amount of lift depends on the angle at which wing is held relative to the air stream.

3. The Cause of Tetanus: -

See Exercise Answer No: 7

4. Secondary Growth: -

1. An increase in the girth of a plant due to the activity of vascular cambium and cork cambium (lateral meristems).
2. It takes place in both the stem and root by the division of vascular cambium located between the xylem and phloem.
3. In the first stage of secondary growth, vascular cambium forms a ring linking a group of vascular bundle and separating the xylem from phloem.
4. In the second step of secondary growth, cells of cambium ring divide to form secondary xylem tissue on inside and secondary phloem on the outside. In between adjacent vascular bundle they form secondary parenchyma.
5. Over years vascular cambium produces layer upon layer of secondary xylem due to which a woody stem gets thicker and thicker.

5. Role of Exoskeleton in Arthropods: -

1. It reduces the risk of desiccation in land animals as it acts as almost impermeable barrier to water.
2. It protects their body organs.
3. It protects arthropods against wear and tear and predators.
4. It provides sites for muscle attachment.

6. Characteristics of Smooth Muscles: -

1. Smooth muscles are structurally the simplest of all muscle types.
2. They consist of long, spindle shaped, uni-nucleated cells that are usually arranged in sheets that surround the body's hollow organs.
3. Smooth muscle has no striation.
4. They are involuntary that is not under the control of animal itself, instead they are automatic being controlled by autonomic nervous system.
4. They are found in the blood vessels, digestive tract, and many other organs.
5. They control the movement of substances through hollow organs.

7. Differences between Epinasty and Hyponasty: -

Epinasty	Hyponasty
1. It occurs due to faster growth on the upper side of the organ.	1. It occurs due to faster growth of the lower surface of the growing organs.
2. It leads to opening of bud or leaf.	2. It leads to formation of a closed bud.

8. Cartilage: -

1. It is a form of connective tissue which is much softer than bone.
2. The living cells of cartilage are called chondrocytes which secrete flexible, elastic, non-living matrix collagen that surrounds the chondrocytes.
3. No blood vessels penetrate into the cartilage.
4. Cartilage covers ends of the bone at the joint, and also supports the flexible portion of nose and external ears.

9. Rickets: -

See Lahore Board Answer No: 22

10. Turgor Pressure: -

1. Turgor pressure is the hydrostatic pressure that develops within a walled cell of a plant.
2. It is developed within the cell of a plant when the osmotic pressure of the cells contents is greater than the osmotic pressure of the surrounding fluid.
3. Tonoplast contains a number of active transport system that pump ions into the vacuole or vacuolar compartments despite the higher concentration than that of the extracellular fluid.
4. Because of the higher ion or solute concentration in vacuole, water flows into it by osmosis, developing an internal hydrostatic pressure which presses the protoplast against the cell wall. This is called turgor pressure.
5. A cell with high turgor pressure is said to be turgid and the condition is called turgidity.
6. Turgor pressure provides turgidity, mechanical support to soft tissues of plants.
7. Turgidity plays a very important role in supporting plants and maintaining their shape and form.
8. The stems of herbaceous plants are held erect by being filled with fully turgid cells packed tightly together.
9. Turgor is also responsible for holding leaves in a flat horizontal position.

11. Hematoma Formation: -

See Lahore Board Answer No: 10

12. Herniation of Disc: -

See Lahore Board Answer No: 3

13. Difference between Tetanus and Muscular Tetany:

See Exercise Answer No: 2

14. Geotropism: -

1. It is the growth movement caused in response to gravitational stimulus. OR
Growth response to gravity in plants is called Geotropism or Gravitropism.
2. Roots display positive geotropism and shoots negative geotropism.

15. Differences between Hyaline Cartilage and Fibrocartilage: -

Hyaline Cartilage	Fibro Cartilage
1. It has high proportions of amorphous matrix with small amount of collagen fibers.	1. It has many collagen fibers embedded in a small amount of matrix.
2. It has great resistance to wear.	2. It is very flexible.
3. It is incapable of repair when fractured.	3. If damaged, it repairs itself slowly.
4. It covers the articular surfaces of nearly all synovial joints.	4. It is found in the discs within joints, in the external pinna of the ear, the external auditory meatus, the auditory tube, and the epiglottis.

16. Calluses:

1. It is a term used in tissue culture, grafting and wound healing.
- a. **Tissue Culture: -**
It is a mass of undeveloped, relatively undifferentiated tissue on an explant (excised tissue or organ).
 - b. **Grafting: -**
It is a mass of undifferentiated tissue developed between two branches after grafting.
 - c. **Wound Healing: -**
Callus is a soft parenchymatous tissue of cambium that is rapidly formed on or below the damaged surface of stem and root.

17. Differences between Primary and Secondary Growth in Plants: -

Primary Growth	Secondary Growth
1. It is an increase in the length of a plant.	1. It is an increase in the girth (thickness) of a plant.
2. It occurs at apical meristems located at the tips of roots and shoots and also within the buds of stems.	2. It occurs due to the activity of lateral meristems located within stems and roots.
3. All plants have primary growth.	3. Only gymnosperms and woody dicots have secondary growth.
4. It produces the entire plant body in herbaceous plants and the young, soft tissues and roots in woody trees and shrubs.	4. Tissues produced by secondary growth comprise the wood and bark, which make up most of the bulk of trees and shrubs.

18. Two Differences between Sclerenchyma and Collenchyma Cells: -

Sclerenchyma Cells	Collenchyma Cells
1. They are dead at maturity.	1. They are alive at maturity.
2. They have primary as well as secondary cell walls.	2. They lack secondary cell wall.

19. Differences Between Hyaline and Fibro-Cartilage:

See Gujrawala Board Answer No: 15

20. Antagonistic Action of Muscles: -

See Faisalabad Board Answer No 24

21. Differences Between Photonasty and Thermonasty: -

Photonasty	Thermonasty
-------------------	--------------------

1. The principal stimulus is photoperiod.	1. The principal stimulus is temperature.
2. This movement is caused by variation in the intensity of light.	2. This movement is caused due to variations in temperature.
3. The flowers of oxalis and portulaca open in day and close at night while flowers of Nicotia close in day and open at night.	3. Crocus and tulip flowers open in increased temperature during day and close at night in decreased temperature.

22. Names of Unpaired Bones of Cranium: -

1. Frontal
2. Occipital
3. Sphenoid
4. Ethmoid

23. Ball and Socket Joint: -

1. It is the joint that allows the movement in several directions.
2. It has at least two pairs of muscles perpendicular to each other.
3. It provides maximum flexibility.
4. Hip joint is an example of ball and socket joint.

Or

1. In ball and socket joint, a ball-shaped head of one bone fits in a socket like concavity of another.
2. This allows movement in several directions.
3. Flexion, extension, medial rotation, lateral rotation etc. are possible.
4. Several pairs of muscles are attached to each of the bones of the joint usually perpendicular to each other.
5. The shoulder joint is good example of this type of joint.

MULTAN BOARD QUESTIONS

1. What is turgor pressure? Give its role in plants. (Multan Board (2008-A))
2. What is Rickets? Give its causes and cure. (Multan Board (2008-A))
3. What is Nutation? (Multan Board (2008-A))
4. Differentiate between Sapwood and Heartwood. (Multan Board (2008-S))
5. Explain the process of Ecdysis. (Multan Board (2008-S))
6. Write about cartilage. (Multan Board (2008-S))
7. Differentiate between Plantigrade and Unguligrade. (Multan Board (2009-A))
8. Differentiate between Phototactic and Chemotectic Movement. (Multan Board (2009-A))
9. Describe Genetic cause of deformation of Skeleton. (Multan Board (2009-A))
10. Name types of growth movements in in plants. (Multan Board (2009-S))
11. Write four functions of Skeletal System.

- (Multan Board (2009-S))
12. Define Antagonistic movements in plants. (Multan Board (2009-S))
13. Name organs of locomotion in the following animals:
 - (i) Earthworm
 - (ii) Starfish
 (Multan Board (2009-S))
14. What is Rigor Mortis? (Multan Board (2010-A))
15. Differentiate between Sarcoplasm of muscle cell and Cytoplasm of other cell. (Multan Board (2010-A))
16. What is Cleft Palate? (Multan Board (2010-A))
17. Explain two functions of plant stem. (Multan Board (2010-S))
18. Write functions of Cambium. (Multan Board (2010-S))
19. Differentiate between sapwood and Heart wood. (Multan Board (2011-A))
20. Write about two types of Nastic Movement. (Multan Board (2011-A))
21. Define the process of Ecdysis. (Multan Board (2011-A))
22. Name any two parts of Hind Limb. (Multan Board (2011-S))
23. Define Nutation. (Multan Board (2011-S))
24. Give any two major functions of skeletal system in animals. (Multan Board (2011-S))
25. What is callus and its role? (Multan Board (2012-A))
26. Give two functions of Skeleton. (Multan Board (2012-A))
27. Differentiate between Hyaline and Fibro Cartilage. (Multan Board (2012-A))
28. State hematoma formation briefly. (Multan Board (2012-S))
29. How does active flight in birds differ from passive flight? (Multan Board (2012-S))
30. What is sapwood and heartwood? (Multan Board (2012-S))
31. What is Rigor Mortis? (Multan Board (2013-A))
32. How the Muscle Fatigue is resulted? (Multan Board (2013-A))
33. Define Plantigrades with example. (Multan Board (2013-A))
34. What are Floating Ribs? (Multan Board (Old Scheme) (2014-A))
35. Differentiate between Fibers and Sclereides. (Multan Board (Old Scheme) (2014-A))
36. What is Tetany? (Multan Board (Old Scheme) (2014-A))
37. Define Turgor and Osmotic Pressure. (Multan Board (New Scheme) (2014-A))
38. What is Hyponasty?

- (Multan Board (New Scheme) (2014-
A)
39. Compare Exoskeleton and Endoskeleton.
(Multan Board (New Scheme) (2014-
A)
40. What is Rigor Mortis?
(Multan Board-New Scheme-2015-
A)
41. How muscle fatigue is produced?
(Multan Board-New Scheme-2015-
A)
42. Differentiate between Tendon and Ligament.
(Multan Board-New Scheme-2015-
A)

Answers

1. A) Turgor Pressure: -

- The pressure within a walled cell of plant resulting the movement of water into the cell is called Turgor pressure.
- Tonoplast surrounding vacuole, actively pumps solutes into the vacuole due to which cells become hypertonic to the outside environment.
- Water moves into the cells by osmosis, their central vacuoles which presses the protoplast against the cell wall, building up turgor pressure against the rigid cell walls. The cell walls stretch only slightly.

B) Role of Turgor Pressure: -

- Turgor pressure provides turgidity that plays a very important role in supporting plants and maintaining their shape and form.
- The stems of herbaceous plants are held erect by being filled with fully turgid cells packed tightly together.
- Turgor is also responsible for holding leaves in a flat horizontal position.

2. Rickets, Cause and Cure: -

See Lahore Board Answer No: 22

3. Nutation: -

See Exercise Answer No: 4

4. Differences between Sapwood and Heartwood: -

Sapwood	Heartwood
1. It is an outer layer of wood close to the bark of older trees.	1. It is the central wood of older trees.
2. It is a younger wood.	2. It is the older wood.
3. It is a thin layer.	3. It is denser than sapwood.
4. It is a lighter colored wood.	4. It is typically a brownish-red.
5. It is the functioning xylem that conducts water and dissolved nutrient minerals.	5. Heartwood no longer functions in conduction but instead functions as a storage site for waste products. It also provides structural support for trees.

5. The Process of Ecdysis: -

- Ecdysis is the process of shedding an old exoskeleton and growing a larger one.
- Ecdysis is divided into four stages:

- Enzymes, secreted from hypodermal glands, begin digesting old endo-cuticle separating hypodermis and the exoskeleton.
- Digestion of endocuticle is followed by secretion of new procuticle and epicuticle.
- Old exoskeleton is split and pores are formed.
- Finally, the new exoskeleton is hardened by deposition of calcium carbonate.

6. Cartilage: -

See Gujranwala Board Answer No: 8

7. Differences between Plantigrade and Digitigrade: -

Plantigrade	Digitigrade
1. These mammals walk on their sole with palm, wrist, and digits all resting more or less on ground.	1. They walk on their digits only.
2. They run slower than digitigrade animals.	2. They run faster than plantigrade animals.
3. Monkeys, apes, man, bear etc. are the examples.	3. Rabbit, rodents etc. are the examples.

8. Differences between Phototactic and Chemotactic Movements: -

Phototactic Movement	Chemotactic Movement
1. Stimulus is light.	1. Stimulus is chemical.
2. The best example of phototactic movement is passive movement of chloroplast due to cyclosis which helps the chloroplast to absorb maximum light for carbon dioxide fixation.	2. The movements shown by sperms of liver-worts, mosses, ferns towards archegonia in response to stimulus of nucleic acid released by the ovum is one such example.

9. Genetic Causes of Deformation of Skeleton: -

1. Cleft Palate:

It is a condition in which palatine processes of maxilla and palatine fail to fuse. It is caused by genetic defect.

2. Microcephaly: -

It is a small sized skull. It is also caused by some genetic defects.

3. Osteoarthritis: -

It is the most common chronic arthritis, which is a degenerative joint disease also caused by genetic defect.

10. Names of Types of Growth Movements in Plants: -

- Epinasty
- Hyponasty
- Nutation

11. Four Functions of Skeletal System: -

- Bones support soft tissues and serve as attachment sites for most muscles.
- Bones protect critical internal organs, such as brain, spinal cord, heart, lungs and reproductive organs.
- Skeletal muscles attached to the bones help move the body.
- Bones provide proper shape to the body.

12. Antagonistic Movements in Plants: -

Roots and shoots of plants show antagonistic movements.

- Roots grow toward gravity while shoots grow away from gravitation.
- Roots grow away from light while shoots grow towards light.
- Roots grow towards water while shoots grow away from water.

13. Names of Organs of Locomotion in:

(i) Earthworm

(ii) Starfish

- Earthworm ---- Setae
- Starfish ----- Tube feet

14. Rigor Mortis: -

After death amount of ATP in the body fall. Under these circumstances the bridges cannot be broken and

so they remain firmly bound. This results in the body becoming stiff, a condition known as Rigor Mortis.

15. Differences between Sarcoplasm of Muscle Cell and Cytoplasm of other Cell: -

Sarcoplasm of Muscle Cell	Cytoplasm of Other Cell
1. It contains usually large amount of stored glycogen.	1. It has small amount of glycogen.
2. It contains myoglobin, a unique oxygen binding protein.	2. It lacks myoglobin.
3. Sarcoplasm of muscle fibers contains tightly packed bundles of filaments called myofibrils.	3. It lacks myofibrils.

16. Cleft palate: -

- Cleft palate is a genetic defect which is associated with cleft upper lip.
- Cleft palate is caused by failure of palatal processes of the maxilla to fuse with each other in the midline; in severe cases these processes also fail to fuse with the primary palate (premaxilla).
- In Cleft palate, the nasal cavities communicate with oral areas, interfering feeding.
- Cleft palate can lead to inhalation of food into lungs causing aspiration pneumonia.

17. Two Functions of Plant Stem: -

- It gives support to the plant.
- It acts as a supply line between root and aerial parts of the plant.

18. Functions of Cambium: -

- It provides additional support, allowing plants to grow to a much larger size.
- It produces sheet of new cells laterally, adding girth (radial growth).
- It produces wood as well as bark.

19. Differences between Sapwood and Heartwood: -

See Multan Board Answer No: 4

20. Two Types of Nastic Movement: -

See Lahore Board Answer No: 18

21. The Process of Ecdysis: -

See Lahore Board Answer No: 16

22. Names of Two Parts of Hind Limb: -

- Femur
- Tibia

23. Nutation: -

See Exercise Answer No: 4

24. Any Two Major Functions of Skeletal System in Animals: -

- Support
- Protection of vital internal organs

25. A) Callus: -

It is wood tissue formed by cambium on or over the wound. OR

Callus is a mass of undifferentiated plant cells

produced

in response to injury.

B) Role of Callus: -

- Callus tissue is formed at the surface of woody plants in response to wounding.
- It unites branches during budding and grafting.
- In tissue culture technique it is used to develop plant organ or whole plant.

26. Two Functions of Skeleton: -

- Bones serve as store house for calcium, phosphorous, sodium and potassium. Through negative feedback mechanisms, bones can release or take up minerals to maintain homeostasis.
- Red and white blood cells are produced in bone marrow, a connective tissue found within certain bones. Or

- Support
- Protection of vital internal organs

27. Differences between Hyaline Cartilage and Fibrocartilage: -

See Gujranwala Board Answer No: 15

28. Hematoma Formation: -

See Lahore Board Answer No: 10

29. Active flight in birds different from Passive Flight:

See Lahore Board Answer No: 9

30. A) Sapwood: -

- The active portion of wood is called sapwood.
- It is the outer or younger portion of the tissue.
- Conduction of water and dissolved substances by secondary xylem is limited to this portion of wood.

B) Heartwood: -

- It is inactive non-conducting wood.
- In most species heartwood accumulates a variety of chemicals such as resins, gums and tannins. These provide a resistance to decay and insect attack, for example, red cedar and conifers.

31. Rigor Mortis: -

See Multan Board Answer No: 14

32. How Muscle Fatigue Resulted: -

See Exercise Answer No: 8

33. Plantigrades with examples: -

- These mammals walk on their sole with palm, wrist, and digits all resting more or less on ground.
- It is the slowest type of locomotion.

3. Examples: -

Monkeys, apes, man, bear etc.

34. Floating Ribs: -

The lower two pairs of ribs of rib cage which do not with sternum are called floating ribs. OR

The eleventh and twelfth pairs of ribs have no

anterior

attachment to sternum and are referred as to Floating ribs. The cartilages of these ribs are embedded in the abdominal musculature.

35. Differences between Fibers and Sclerites: -

See Lahore Board Answer No: 25

36. Tetany: -

1. It is a painful state of muscle contracture.
2. It is caused by low calcium in the blood.
3. It increases excitability of neurons and results in loss

of sensation. Muscle twitches.

4. If untreated the system progresses to spasm of larynx, respiratory paralysis and ultimately death occurs.

37. A) Turgor Pressure: -

It is the pressure of the cell contents against the cell wall.

B) Osmotic Pressure: -

1. The potential pressure developed by a solution separated from pure water by a differentially permeable membrane. OR

It is the pressure that must be exerted on the hypertonic side of a selectively permeable

membrane

to prevent diffusion (by osmosis) from the side containing pure water.

It is also called osmotic potential.

38. Hyponasty: -

1. It is movement that occurs due to faster growth of the lower surface of the growing organs.
2. If growth in the lower surface of the leaf in bud condition is more than that of upper surface then the bud will remain closed.
3. It is a kind of autonomic movement in which stimulus is internal.

39. Comparison of Exoskeleton and Endoskeleton: -

Exoskeleton	Endoskeleton
1. Exoskeleton lies outside the body of the animal.	1. Endoskeleton lies surrounded by the muscles.
2. The exoskeleton is primitive and is found usually in primitive animals i.e. mostly the invertebrates.	2. It is found in vertebrates.
3. It is inert and non-living.	3. It is composed of living tissues, which may be of two kinds cartilage and bone.
4. It is secreted by the ectodermal cells in multicellular animals.	4. It is derived from mesoderm.
5. The exoskeleton is usually very rigid and heavy and thus limits the size of an animal.	5. It does not limit the size of animal.
	6. The bones connected by joints and moved by muscles form the most efficient system for

6. It, except one group (arthropods), restricts the animal movement.

7. It does not allow for the growth of the animal.

If such an animal has to grow, it has to cast of

(molt) and re-secrete its exoskeleton periodically.

locomotion.

7. Endoskeleton is by no means the hindrance to the growth of animals. The internal bones can grow with the growth of the body as these bones contain living tissues.

40. Rigor Mortis: -

See Multan Board Answer No: 14

41. Production of Muscle Fatigue: -

See Exercise Chapter No: 16 Answer No: 8

42. Differences between Tendon and Ligament: -

See Lahore Board Answer No: 6

BAHAWALPUR BOARD QUESTIONS

1. Differentiate between epinasty and hyponasty. (Bahawalpur Board (2008-A))
2. Explain collenchyma cells. (Bahawalpur Board (2008-A))
3. What is cartilage? (Bahawalpur Board (2008-A))
4. Write about Epinasty and Hyponasty. (Bahawalpur Board (2008-S))
5. What is difference between Exoskeleton and Endoskeleton? (Bahawalpur Board (2008-S))
6. Write about Arthritis. (Bahawalpur Board (2008-S))
7. What is Disc Slip? (Bahawalpur Board (2009-S))
8. What are Sapwood and Heartwood? (Bahawalpur Board (2009-S))
9. What is the difference between a bone and cartilage? (Bahawalpur Board (2009-S))
10. Differentiate between Vascular and Cork Cambium. (Bahawalpur Board (2010-A))
11. Define Tetanus. Give its symptoms. (Bahawalpur Board (2010-A))
12. Why does molting take place in Arthropods? (Bahawalpur Board (2010-A))
13. Differentiate between Ligaments and Tendons. (Bahawalpur Board (2011-A))
14. Give symptoms and causes of Sciatica. (Bahawalpur Board (2011-A))
15. Name unpaired facial bones. (Bahawalpur Board (2011-A))
16. Write down the function of Heartwood. (Bahawalpur Board (2012-A))
17. What are different types of Cartilage? (Bahawalpur Board (2012-A))
18. Write down the mechanism of Rapid Movement of Leaflets. (Bahawalpur Board (2012-A))
19. Explain the process of Ecdysis.

- (Bahawalpur Board (2013-
A)
20. What is Antagonism? Give an example.
(Bahawalpur Board (2013-
A)
21. Differentiate between two types of Nastic
Movement.
(Bahawalpur Board (2013-
A)
22. Briefly explain Hematoma Formation.
(Bahawalpur Board (New Marks Scheme) (2014-
A)
23. What are Aero-foils?
(Bahawalpur Board (New Marks Scheme) (2014-
A)
24. What are the characteristics of Smooth Muscles?
(Bahawalpur Board (New Marks Scheme) (2014-
A)
25. Give the types of Cartilage.
(Bahawalpur Board-New Marks Scheme-2015-
A)
26. What is Rickets?
(Bahawalpur Board-New Marks Scheme-2015-
A)
27. What is All or None Response?
(Bahawalpur Board-New Marks Scheme-2015-
A)

Answers

1. **Differences between Epinasty and Hyponasty:** -
See Gujranwala Board Answer No: 7
2. **Collenchyma Cells:** -
See Lahore Board Answer No: 11
3. **Cartilage:** -
See Gujranwala Board Answer No: 8
4. **A) Epinasty:** -
1. When movement occurs due to faster growth on the
upper side of the organ, it is called epinasty.
2. It is shown by leaves, petals etc.
3. The upper surface of leaf in bud condition shows
more growth as compared with the lower surface. This
leads to opening of bud.
B) Hyponasty: -
See Multan Board Answer No: 38
5. **Differences between Exoskeleton and
Endoskeleton:** -

Exoskeleton	Endoskeleton
1. Exoskeleton lies outside the body of the animal.	1. Endoskeleton lies surrounded by the muscles.
2. The exoskeleton is primitive and is found usually in primitive animals i.e. mostly the invertebrates.	2. It is found in vertebrates.
3. It is inert and non-living.	3. It is composed of living tissues, which may be of two kinds cartilage and bone.
4. It is secreted by the ectodermal cells in multicellular animals.	4. It is derived from mesoderm.
5. The exoskeleton is usually very rigid and	5. It does not limit the size of animal.
	6. The bones connected by joints and

heavy and thus limits the size of an animal.

6. It, except one group (arthropods), restricts the animal movement.

7. It does not allow for the growth of the animal. If such an animal has to grow, it has to cast of (molt) and re-secrete its exoskeleton periodically.

moved by muscles form the most efficient system for locomotion.

7. Endoskeleton is by no means the hindrance to the growth of animals. The internal bones can grow with the growth of the body as these bones contain living tissues.

6. Arthritis: -

Arthritis covers over 100 different types of inflammatory or degenerative diseases that damage the joints. It results in pain, stiffness, swelling of the joint. Acute forms of arthritis usually result from bacterial invasion and are treated with antibiotics.

The membrane lining the joint thickens, fluid production

is decreased, which consequently leads to increased friction. Chronic arthritis includes osteoarthritis, rheumatoid arthritis, and gouty arthritis.

Osteoarthritis

(O.A) is the most common chronic arthritis, which

is degenerative joint disease also caused by genetic defect.

OR

1. Arthritis covers over 100 different types of inflammatory or degenerative diseases that damage the joints.

2. It may be hereditary, may be due bacterial or viral infection or due to an injury, or sometime only due

to aging.

3. In arthritis:

a. The smooth and flexible cartilage between the bones of a joint is either degenerated or hardened by deposits

of calcium.

b. Synovial membrane becomes thick.

c. Synovial fluid is reduced.

4. Arthritis can be classified into:

A) Inflammatory Disorders: -

a) Bacterial Arthritis: -

i. It usually results from bacterial invasion.

ii. It is an acute inflammatory arthritis.

iii. In bacterial arthritis, synovial membrane lining the joints, thickens, fluid production is decreased which consequently leads to increased friction. Symptoms

of this type of arthritis include pain, swelling and stiffness of the joints. There may be limitation of joint motion.

vi. Treatment is with appropriate antibiotics.

b) Rheumatoid Arthritis: -

i. It is essentially an inflammation of synovial membrane.

ii. It is a chronic arthritis.

B) Non-inflammatory Degenerative Disease:

a) Gouty Arthritis: -

It is chronic non-inflammatory disorder.

b) Osteoarthritis: -

i. It is the most common non-inflammatory degenerative

disease affecting the moveable joints.

ii. It is a chronic disorder.

iii. It is also caused by genetic defects.

7. Disc Slip: -

See Lahore Board Answer No: 3

8. Sapwood and Heartwood: -

See Multan Board Answer No: 30

9. Differences between a Bone and Cartilage: -

Bone	Cartilage
1. It is most rigid form of connective tissue.	1. It is the soft and flexible form of connective tissue.
2. Bone is highly vascular tissue.	2. No blood vessel penetrates in to the cartilage.
3. Bone has three types of cells i.e. Osteoblast, Osteocyte, and Osteoclast.	3. The living cells of cartilage are called Chondrocytes.
4. The main protein in the matrix is collagen which is hardened by calcium phosphate.	4. Collagen is not hardened by calcium phosphate.

10. Differences between Vascular and**Cork Cambium: -**

Vascular Cambium	Cork Cambium
1. Vascular cambium is a lateral meristem that first appears between the primary xylem and primary phloem and is located between the wood and bark of a woody plant.	1. Cork cambium is a lateral meristem located beneath the epidermis close to the bark.
2. Vascular cambium is a layer of meristematic cells that forms a long, thin, continuous cylinder within the stem and root.	2. Cork cambium is composed of a thin cylinder or irregular arrangement of meristematic cells.
3. It divides and produces secondary xylem and secondary phloem in each succeeding year.	3. Cells of cork cambium divide and form cork cells toward the outside and one or more under laying layers of cork parenchyma.
4. The vascular cambium increases stem or root diameter.	4. Outer bark (periderm) produced by cork cambium functions as a replacement for the epidermis.

11. A) Tetanus: -

1. Tetanus is an acute bacterial infectious disease caused

by exotoxins produced by anaerobic bacillus *Clostridium tetani*.

B) Symptoms of Tetanus: -

Tetanus results in persistent painful spasms of some skeletal muscle. It typically begins with stiffness of jaws and neck muscles and progresses to fixed rigidity

of jaws (lock jaw) and spasms of trunk and limb muscles usually fatal due to respiratory failure.

12. Why Molting Takes place: -

Exoskeleton is non-living and non-growing and it limits the growth of the animal. Hence, when arthropods have to grow they need to shed exoskeleton periodically and replace it with one of

the

larger size, the process called molting.

13. Differences between Ligament and Tendon: -

See Lahore Board Answer No: 6

14. A) Symptoms of Sciatica: -

1. Stabbing pain in the posterior aspects of the thigh, the posterior and lateral sides of the leg and lateral part of the foot.

2. Paralysis of muscles below knee

3. Loss of sensation below the knee.

B) Causes of Sciatica: -

See Lahore Board Answer No: 4

15. Names of Unpaired Facial Bones: -

1. Maxilla

2. Nasal

3. Zygomatic

4. Lacrimal

5. Palatine

6. Inferior concha

16. Function of Heartwood: -

Heartwood accumulates a variety of chemicals such as

resin, oils, gums, and tannins. These provide a resistance to decay and insect attack, for example, in red cedar and conifers.

17. Different Types of Cartilage: -

See Lahore Board Answer No: 20

18. Mechanism of Rapid Movement of Leaflet: -

Rapid movement of leaflets (folding) of *Mimosa* (touch me not) is due to rapid loss of turgor (within

1

to 2 seconds) by the cells in the pulvinus at the base

of

each leaflet. The investigation has shown that potassium (K⁺) ions move first, which causes water

to

leave the cell by ex-osmosis.

19. The Process of Ecdysis: -

See Multan Board Answer No: 5

20. Antagonism with an Example: -

The process in which two structures work or function

in opposite or antagonistic fashion, what one can do other can undo, is called Antagonism.

Example: -

Movement at elbow joint is produced by antagonism of a muscle pair. They act against each other. In the elbow muscle pair consists of the biceps and triceps. Contraction of biceps bends (flexes) the arm, contraction of triceps straightens (extends) the arm. When either muscle contracts, the other normally relaxes.

21. Differences between Two Types of Nastic Movement: -

Nyctinastic Movement	Haptonastic Movement
1. Stimulus is either light or temperature.	1. Stimulus is contact or touch.

- | | |
|---|--|
| 2. It is observed in Tulip flowers which close at night because of rapid growth in the lower side by upward and inward bending of the petals. | 2. It is observed in many insectivorous plants such as Venus fly trap in which touch of insect causes the closing of trap. |
|---|--|

22. Hematoma Formation: -

See Lahore Board Answer No: 10

23. Aero-foils: -

1. An aero-foil is any smooth surface which moves through the air at any angle to the air stream.
2. The bird wings act as aero-foils.
3. An aero-foil is used to generate lift in all types of flight.
4. The size, shape, and orientation of the aero-foil determines flight performance.

24. Characteristics of Smooth Muscles: -

See Gujranwala Board Answer No: 6

25. Types of Cartilage: -

See Lahore Board Answer No: 20

26. Rickets: -

See Lahore Board Answer No: 22

27. All or None Response: -

The contraction of each muscle fiber is based on "All or

None Response" i.e. all of its fibers participate in contraction. The degree of contraction depends upon the number of fibers that participate in contraction.

Or
The contraction of each muscle fiber is based on "All or

None Response" It means:

- a. Once an impulse reaches a muscle fiber, either the muscle contracts fully or it does not contract at all, there is no partial contraction for a given fiber.
- b. All of the fibrils of a muscle participate in contraction.
- c. All the contractions are of the same intensity. The degree of contraction depends upon the number of fibers that participate in contraction.

FAISALABAD BOARD QUESTIONS

1. Differentiate between sap wood and heart wood. (Faisalabad Board (2008-A))
2. What is meant by Epinasty and Hyponasty? (Faisalabad Board (2008-A))
3. What is the role of Ecdysone? (Faisalabad Board (2008-A))
4. Differentiate between phototactic movement and chemotactic movement. (Faisalabad Board (2009-A))
5. What are the disadvantages of exoskeleton. (Faisalabad Board (2009-A))
6. Explain the term Active flight. (Faisalabad Board (2009-A))
7. Define the term Remodeling. (Faisalabad Board (2009-A))

8. Define callus and give its functions. (Faisalabad Board (2010-A))
9. Differentiate nyctinasty from haptinasty. (Faisalabad Board (2010-A))
10. Differentiate exoskeleton from endoskeleton. (Faisalabad Board (2010-A))
11. Define ecdysis and give its four stages. (Faisalabad Board (2011-A))
12. Differentiate between cartilage and bone. (Faisalabad Board (2011-A))
13. Sketch and label forelimb of humans. (Faisalabad Board (2010-A))
14. Briefly explain hematoma formation. (Faisalabad Board (2012-A))
15. Define aerofoils. (Faisalabad Board (2012-A))
16. Differentiate between ligament and tendon. (Faisalabad Board (2012-A))
17. How does tendon differ from ligament? (Faisalabad Board (2013-A))
18. Differentiate between sapwood and heartwood. (Faisalabad Board (2013-A))
19. What are disadvantages of exoskeleton. (Faisalabad Board (2013-A))
20. What do you mean by origin and insertion of a muscle? (Faisalabad Board (Old Scheme) 2014)
21. What is passive flight? (Faisalabad Board (Old Scheme) 2014)
22. Name three modes of locomotion in mammals. (Faisalabad Board (Old Scheme) 2014)
23. Write two differences between sclerenchyma and collenchyma cells. (Faisalabad Board (New Scheme) 2014)
24. What is antagonistic action of muscles? (Faisalabad Board (New Scheme) 2014)
25. Differentiate between hyaline and fibro cartilage. (Faisalabad Board (New Scheme) 2014)
26. Name bones of pelvic girdle. (Faisalabad Board-New Scheme-2015-A)
27. Give hormonal causes for deformity of skeleton. (Faisalabad Board-New Scheme-2015-A)
28. What is foramen triosseum? How is it formed? (Faisalabad Board-New Scheme-2015-A)

Answers**1. Differences between Sapwood and Heartwood:**

See Multan Board Answer No: 4

2. A) Epinasty: -

See Bahawalpur Board Answer No: 4

B) Hyponasty: -

See Multan Board Answer No: 38

3. Role of Ecdysone: -

It brings about shedding of the cuticle and growth.

OR

All the changes occurring in ecdysis are controlled by hormone ecdysone.

4. Differences between Photo-tactic Movement and Chemotactic Movement: -

See Multan Board Answer No: 8

5. Disadvantages of Exoskeleton: -

1. It limits the ultimate size of an animal due to its weight.
2. It also limits the growth of animal. As animal outgrows, it is shed and new one is formed.
3. It leaves the arthropods temporarily vulnerable to predators.
4. With the exception of arthropods it restricts the animal's movements to the extent that animals possessing it must lead a very slow moving life or even a sessile life (corals).

6. Active Flight: -

When little or no support can be gained from upward

air currents, the same effect can be achieved by flapping the wings. As the birds move through the air,

the air flows more quickly over the curved upper surface than the lower surface. This reduces the air pressure on the top of the wing, compared with air pressure below the wing. There is, therefore, a net upward pressure on the wing which gives lift to the bird.

7. Remodeling: -

The process in which bone gains its original form is known as Remodeling.

8. Callus and its Functions: -

See Multan Board Answer No: 25

9. Differences between Nyctinasty and Haptonasty: -

See Bahawalpur Board Answer No: 21.

10. Differences between Exoskeleton and Endoskeleton:

See Multan Board Answer No: 39

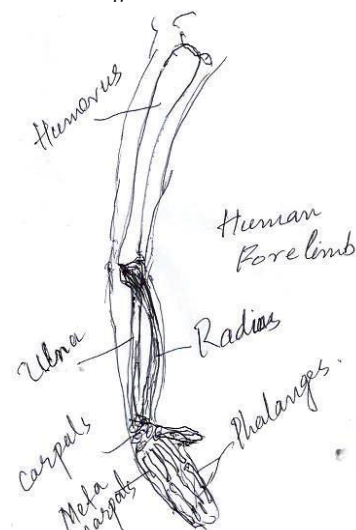
11. Ecdysis and its Four Stages: -

1. Ecdysis is the process of shedding an old exoskeleton and growing a larger one.
2. Ecdysis is divided into following four stages:
 - a. Enzymes, secreted from hypodermal glands, begin digesting old endo-cuticle separating hypodermis and the exoskeleton.
 - b. Digestion of endocuticle is followed by secretion of new procuticle and epicuticle.
 - c. Old exoskeleton is split and pores are formed.
 - d. Finally, the new exoskeleton is hardened by

deposition of calcium carbonate.

12. Differences between a Bone and Cartilage: -

See Bahawalpur Board Answer No: 9

13. Labeled Diagram of Forelimb of Humans: -**14. Hematoma Formation: -**

See Lahore Board Answer No: 10

15. Aero-foils: -

See Bahawalpur Board Answer No: 23

16. Differences between Ligament and Tendon: -

See Lahore Board Answer No: 6

18. Differences between Sapwood and Heartwood: -

See Multan Board Answer No: 4

17. Differences between Ligament and Tendon: -

See Lahore Board Answer No: 6

19. Disadvantages of Exoskeleton: -

See Faisalabad Board Answer No: 5

20. Origin and Insertion of a Muscle: -

1. Origin is the end of muscle which remains fixed when

muscle contracts.

2. Insertion is the end of muscle that moves. OR The skeletal muscle has two or more attachment.

The

attachment that moves the least is referred to as the origin, and that moves the most, the insertion. Under varying circumstances the degree of mobility of the attachments may be reversed, and therefore the

terms

origin and insertion are interchangeable.

21. Passive Flight: -

In passive or gliding flight a birds's wings act as aerofoils (i.e. aeroplane wings). Air flowing the curved upper surface moves faster than it does over the lower surface. This effectively produces a high pressure on the lower surface and low pressure on the upper surface and so provide a lifting force.

22. Names of Three Modes of Locomotion in Mammals:

1. **Plantigrade** ----- Mammals walk on their sole with palm, wrist and digits all resting on ground.
 2. **Digitigrades** ----- Mammals walk on their digits only.
 3. **Unguligrades** ---- Mammals walk on modified tips (hooves) of toes.

23. Two Differences between Sclerenchyma and Collenchyma Cells: -

See Gujranwala Board Answer No: 18

24. Antagonistic Action of Muscles: -

1. There are 650 muscles in human body, most of which occurs in pairs. At joints these muscles work against each other by contraction. This relationship is called antagonistic.

2. The movement of elbow joint by biceps and triceps is

the best example of antagonism or antagonistic action

of muscles. The biceps (flexor) bend the arm at elbow

joint and the triceps (extensor) straightens it.

25. Differences between Hyaline and Fibro

Cartilage: -

See Gujranwala Board Answer No: 15

26. Names of Bones of Pelvic Girdle: -

Pelvic Girdle consists of two coxal bones. Each coxal

bone is formed of three bones ilium, ischium and pubis.

27. Hormonal Causes for Deformity of Skeleton: -

1. Osteoporosis is a deformity of skeleton caused by decreased estrogen level (a hormone).
 2. It mostly occurs in aged women.
 3. Osteoporosis is a group of disease in which reabsorption out paces bone due to which bone mass

is reduced but chemical composition of the matrix remains same.

4. Estrogen replacement therapy (ERT), offers the best protection against osteoporosis bone fractures.

28. A) Foramen Triosseum: -

It is a cavity between the scapula, coracoid and clavicle bones.

B) Formation of Triosseum: -

RAWALPINDI BOARD QUESTIONS

1. What is Turgor pressure? Give its role in plants.
 (Rawalpindi Board (2010-A)
 2. What is difference between Endoskeleton and Exoskeleton?
 (Rawalpindi Board (2010-A)
 3. Name the bones of Pelvic girdle in Man.
 (Rawalpindi Board (2010-A)
 4. Names the cells associated with bone.

(Rawalpindi Board (2010-A)

5. What are the organs of locomotion in *Euglena*, *Paramecium*, *Amoeba*, Starfish?

(Rawalpindi Board (2010-A)

6. Name two types of sclerenchymatous cells. Give their function.

(Rawalpindi Board (2011-A)

7. Differentiate between exoskeleton endoskeleton.

(Rawalpindi Board (2011-A)

8. How a cilium beat and help in locomotion of *Paramecium* according to suggestion of Bradford?

(Rawalpindi Board (2011-A)

9. Give the cause of cramp. (Rawalpindi Board (2012-A)

10. Give three disadvantages of exoskeleton.
 (Rawalpindi Board (2012-A)

11. Define nastic movement. Name its types.
 (Rawalpindi Board (2012-A)

12. What is muscle fatigue? Give its causes.

(Rawalpindi Board (2013-A)

13. Write down the composition of thin filament of myofibril.
 (Rawalpindi Board (2013-A)

14. Give the function of ligament and tendons.
 (Rawalpindi Board (2013-A)

15. Explain the terms epinasty and hyponasty.
 (Rawalpindi Board-New Pattern-2014-A)

16. Differentiate between sclerenchyma cells and collenchyma cells.
 (Rawalpindi Board-New Pattern-2014-A)

17. Give role of skeleton in internal homeostasis and blood cell production.
 (Rawalpindi Board-New Pattern-2014-A)

18. How does Tendon differ from Ligament?
 (Rawalpindi Board-New Pattern-2015-A)

19. Differentiate between sapwood and heartwood.
 (Rawalpindi Board-New Pattern-2015-A)

20. What are disadvantages of Exoskeleton?
 (Rawalpindi Board-New Pattern-2015-A)

21. What is the function of the following?
 (Rawalpindi Board-New Pattern-2015-A)

22. What is the function of the following?
 (Rawalpindi Board-New Pattern-2015-A)

23. What is the function of the following?
 (Rawalpindi Board-New Pattern-2015-A)

24. What is the function of the following?
 (Rawalpindi Board-New Pattern-2015-A)

25. What is the function of the following?
 (Rawalpindi Board-New Pattern-2015-A)

26. What is the function of the following?
 (Rawalpindi Board-New Pattern-2015-A)

27. What is the function of the following?
 (Rawalpindi Board-New Pattern-2015-A)

28. What is the function of the following?
 (Rawalpindi Board-New Pattern-2015-A)

29. What is the function of the following?
 (Rawalpindi Board-New Pattern-2015-A)

30. What is the function of the following?
 (Rawalpindi Board-New Pattern-2015-A)

31. What is the function of the following?
 (Rawalpindi Board-New Pattern-2015-A)

32. What is the function of the following?
 (Rawalpindi Board-New Pattern-2015-A)

33. What is the function of the following?
 (Rawalpindi Board-New Pattern-2015-A)

34. What is the function of the following?
 (Rawalpindi Board-New Pattern-2015-A)

35. What is the function of the following?
 (Rawalpindi Board-New Pattern-2015-A)

36. What is the function of the following?
 (Rawalpindi Board-New Pattern-2015-A)

37. What is the function of the following?
 (Rawalpindi Board-New Pattern-2015-A)

38. What is the function of the following?
 (Rawalpindi Board-New Pattern-2015-A)

39. What is the function of the following?
 (Rawalpindi Board-New Pattern-2015-A)

40. What is the function of the following?
 (Rawalpindi Board-New Pattern-2015-A)

Answers

1. Turgor Pressure and its Role: -

See Multan Board Answer No: 1

2. Differences between Exoskeleton and Endoskeleton: -

See Multan Board Answer No: 39

3. Names of the Bones of Pelvic Girdle in Man: -

1. Ilium ----- Two
 2. Ischium -- Two
 3. Pubis ----- Two
 These are united to form two Coxal bones.

4. Names of the Cells associated with Bone: -

See Lahore Board Answer No: 27

5. Organs of Locomotion in *Euglena*, *Paramecium*, *Amoeba* and Starfish: -

1. *Euglena* ----- Flagella
2. *Paramecium* ---- Cilia
3. *Amoeba* ----- Pseudopodia
4. Starfish ----- Tube feet

6. Names with their Functions of Two Types of Sclerenchymatous Cells: -

1. Fibers ----- They provide support and flexibility to stem and leaves.
2. Sclereids ----- They provide support and hardness to nuts and seed coats.

7. Differences between Exoskeleton and Endoskeleton: -

See Multan Board Answer No: 39

8. Role of Cilium in Locomotion:-

Bradford suggested that movement of cilia is due to the simultaneous contraction or sliding of double fibrils in two group one after the other.

1. Five out of nine (5/9) double fibrils contract or slide simultaneously with the result cilium bends or shorten.

It is called effective stroke.

2. The four out of nine (4/9) double fibrils contract and cilium becomes straight. It is called recovery stroke. As a result of bending and recovery strokes the *Paramecium* swims against water. The energy for the movement of cilia is provided from ATP.

9. Cause of Cramp: -

Cramps is caused by spinal cord reflexes which are produced due to low blood sugar level, electrolyte depletion and dehydration.

10. Three Disadvantages of Exoskeleton: -

See Faisalabad Board Answer No: 5

11. A) Nastic Movement: -

1. Nastic movements occur in response to external stimuli. It is the variation in the intensity of some external factor rather than direction which acts as a stimulus. Even if the stimulus is unidirectional, the response of a plant is always the same whatever the direction from which the stimulus proceeds.
2. It is a growth movement. Changes in the turgor pressure are also involved

B) Names of Types of Nastic Movement: -

1. Nyctinasty
2. Haptonastic

12. A) Muscle Fatigue: -

1. Muscle fatigue is a state of physiological inability of muscles to contract.
2. It leads to pain in the muscle which produces tiring condition of the muscle.

B) Causes of Muscle Fatigue: -

1. It results from relative deficit of ATP.
2. Due to deficit of ATP, ATP requirement is met by shifting of aerobic break down of glucose to its anaerobic break down due to which lactic acid is produced. Lactic acid causes muscle pH to drop and muscle to ache and exhausted.

14. A) Function of Ligament: -

It stretches to allow limited movement at joints.

B) Function of Tendons: -

When muscle contracts, it pulls on tendon which in turn pulls the bone causing it to move.

13. Composition of Thin Filament of Myofibril: -

Thin filaments are 7-8 nm thick and consist of following three types of protein molecules:

a. Actin Molecules: -

Thin filaments are composed chiefly of actin molecules. The actin molecules are arranged in two chains which twist each other like a twisted double strand pearls.

b. Tropomyosin Molecules: -

Twisting around the actin chains are two strands of another protein tropomyosin.

c. Troponin Molecules: -

The other major protein in the thin filament is troponin. It is actually three polypeptide complex,

one binds to actin, another binds to tropomyosin while third binds calcium ions.

14. A) Function of Ligament: -

It stretches to allow limited movement at joints.

B) Function of Tendons: -

When muscle contracts, it pulls on tendon which in turn pulls the bone causing it to move.

15. A) Epinasty: -

1. Epinasty occurs when the upper surface of leaf in bud condition shows more more growth as compared with the lower surface.
2. It leads to opening of buds.
3. It is shown by leaves, petals etc.

B) Hyponasty: -

1. Hyponasty occurs when growth in the lower surface of the leaf in bud condition is more than that of the upper surface.

2. It leads to closing of bud.

3. It is shown by leaves, petals etc.

16. Differences between Sclerenchyma cells and Collenchyma Cells: -

See Sahiwal Board Answer No: 4

17. A) Role of Skeleton in Internal Homeostasis: -

Bones serve as store for calcium, phosphorous, sodium, and potassium. Through negative feed back mechanisms, bones can release or take up minerals

to maintain homeostasis.

B) Role of Skelton in Blood Cell Production: -

Red and white blood cells are produced in bone marrow, a connective tissue found within certain bones.

18. Tendon different from Ligament: -

See Lahore Board Answer No: 6

19. Differences between Sapwood and Heartwood: -

See Multan Board Answer No: 4

20. Disadvantages of Exoskeleton: -

See Faisalabad Board Answer No: 5

SARGODHA BOARD QUESTIONS

1. Differentiate between epinasty and hyponasty.
(Sargodha Board (2010-A))
2. Compare hinge joint and ball and socket joint.
(Sargodha Board (2010-A))
3. What are the effects of exercise on muscles.
(Sargodha Board (2010-A))
4. Give two types of cartilages, how they differ from each other.
(Sargodha Board (2011-A))
5. Characterize digitigrade animals.
(Sargodha Board (2011-A))
6. Discuss Jet propulsion.
(Sargodha Board (2011-A))
7. Characterize the disease—“Tetany”.
(Sargodha Board (2011-A))
8. Define photo tactic movement and photo nastic movement.
(Sargodha Board (2012-A))
9. Name the bones of pelvic girdle.
(Sargodha Board (2012-A))
10. Give two modifications in the exoskeleton of arthropods.
(Sargodha Board (2012-A))
11. Define turgor pressure. What is its importance.
(Sargodha Board (2013-A))
12. Define molting. Give its one importance.
(Sargodha Board (2013-A))
13. What are plantigrade? Give its example.
(Sargodha Board (2013-A))
14. Name components of human axial skeleton.
(Sargodha Board (New Scheme) 2014-A)
15. Define Hinge joint. Give example.
(Sargodha Board (New Scheme) 2014-A)
16. What is vascular cambium? Give its functions.
(Sargodha Board (New Scheme) 2014-A)

Answers

1. **Differences between Epinasty and Hyponasty:** - See Gujranwala Board Answer No: 7
2. **Comparison of Hinge Joint and Ball and Socket Joint:** -

Hinge Joint	Ball and Socket Joint
1. These joints resemble the hinge on a door.	1. In ball and socket joints, a ball-shaped head of one bone fits in a socket like concavity of another.
2. It allows movement in two directions.	2. This allows movement in several directions.
3. Flexion and extension movements are possible.	3. Flexion, extension, medial rotation, lateral rotation etc. are possible.
4. At these joints, a pair of muscles is arranged in the same plane as that of joints.	4. Several pairs of muscles are attached to each of the bones of the joint usually perpendicular to each other.
5. Examples of hinge joints are elbow, knee and ankle joints.	

5. The shoulder and hip joints are good examples of this type of joint.
3. **Effects of Exercise on Muscles:** - Regular exercise make changes in the muscle itself. Aerobic exercises such as swimming, jogging, and fast walking result in several changes in skeletal muscles. Capillaries surrounding the muscle fibers, as well as mitochondria within them increase in number and fibers synthesize more myoglobin, a protein that stores oxygen. These changes result in more efficient muscle metabolism and resistance to fatigue. Muscles not routinely stimulated gradually atrophy or diminish in size and strength.
4. **Differences between Hyaline Cartilage and Fibrocartilage:** - See Gujranwala Board Answer No: 15
5. **Digitigrade Animals:** -
 1. These mammals walk on their digits only.
 2. In these mammals their first digit is usually reduced or completely lost.
 3. They run faster than plantigrade animals but slower than unguligrade animals.
- Examples:** - Rabbits and rodents
6. **Jet Propulsion:** - Jellyfish has umbrella like body called bell. First of all water enters in the bell then the bell contracts, water is forced out like a jet and the animal moves forward. This movement is known as Jet Propulsion.
- OR
1. Jelly fish moves by jet propulsion in which circular subumbrellar muscles of jellyfish contract ejecting water from the bell and moving the animal in the opposite direction.
2. The cephalopod mollusks also have the ability to move by jet propulsion.
7. **Tetany:** - See Multan Board Answer No: 36
8. **A) Photo-tactic Movement:** -
 1. It is a movement of locomotion.
 2. Stimulus is light.
 3. Response is directional, either towards or away from light.
 4. Passive movement of chloroplasts due to cyclosis towards light to absorb maximum light for carbon dioxide fixation is an example of photo-tactic movement.
- B) Photo-nastic Movement:** -
 1. It is growth movement.
 2. Stimulus is photoperiod (intensity and duration of light).
 3. The flowers open and close due to light intensity.
9. **Names of the Bones of Pelvic Girdle in Man:** - See Rawalpindi Board Answer No: 3

10. Two Modifications in the Exoskeleton of Arthropods:

1. Exoskeleton is modified to form firm ridges and bars for muscle attachment by invagination
2. It is also modified to form sensilla in the form of pegs, bristles and lenses. OR

1. In arthropods, it is flexible and soft at joints allowing them to move easily.
2. It is also modified to permit gaseous exchange.

11. A) Turgor Pressure: -

It is the pressure of the cell contents against the cell wall.

B) Importance of Turgor Pressure: -

Turgor pressure in plant cells is extremely important to the maintenance of the plant's erect position.

12. A) Molting:

Molting is the process of shedding an old exoskeleton and growing a larger one.

B) One Importance of Molting: -

Animal grows into larger size.

13. Plantigrades with example: -

See Multan Board Answer No: 13

14. Names of Components of Human Axial Skeleton:

-
- 1. Skull
- 2. Rib Cage
- 3. Vertebral Column
- 4. Sternum

15. Hinge joint with Example: -

1. It is a type of synovial joint.
2. It allows movement in two directions.
3. At hinge joint, pair of muscles are arranged in the same plane as that of joint. One end of each muscle, the origin, is fixed to the moveable bone on one side of the joint, and other end of muscles, the insertion, is

attached to the far side of the joint.

4. Hinge joints are at elbow and knee. Or

1. These joints resemble the hinge on a door.
2. It allows movement in two directions.
3. Flexion and extension movements are possible.
4. At these joints, a pair of muscles is arranged in the same plane as that of joints.
5. Examples of hinge joints are elbow, knee and ankle joints.

16. A) Vascular Cambium: -

1. It is a lateral meristematic tissue.
2. Vascular cambium first appears as a cylinder of actively dividing cells between primary xylem and primary phloem.
3. Vascular cambium gives rise to two new tissues, one is the secondary xylem (causing most of the increase in stem thickness) next to the inner surface of the vascular cambium, the other is the secondary phloem appearing outer to the vascular cambium.

B) Functions: -

1. Vascular cambium is responsible for the production of secondary vascular tissue during secondary growth.
2. It forms callus or wood tissue on or around the wound.
3. Vascular cambium also forms calluses between branches that unite them during budding and grafting.

DERA GHAZI KHAN BOARD QUESTIONS

1. How cartilage differ from bone? (D.G.K. Board (2009-A))
2. What is Antagonism? (D.G.K. Board (2009-A))
3. How Starfish move? (D.G.K. Board (2009-A))
4. What is microcephaly? (D.G.K. Board (2009-A))
5. What is Pulvinus? (D.G.K. Board (2010-A))
6. Differentiate between Axial skeleton and Appendicular skeleton. (D.G.K. Board (2010-A))
7. Give two changes which occur in muscle due to aerobic exercises. (D.G.K. Board (2010-A))
8. What is Pulvinus? (D.G.K. Board (2011-A))
9. Define tonoplast, give its function as well. (D.G.K. Board (2011-A))
10. How does tendon differ from ligament? (D.G.K. Board (2011-A))
11. Differentiate brachialis and brachioradialis. (D.G.K. Board (2011-A))
12. Write brief note on tetany. (D.G.K. Board Group-I (2012-A))
13. How is ricket produced? (D.G.K. Board Group-I (2012-A))
14. What are the differences between hinge joints and ball and socket joints? (D.G.K. Board Group-I (2012-A))
15. Differentiate collenchyma from parenchyma. (D.G.K. Board Group-I (2012-A))
16. How epinasty leads to opening of buds? (D.G.K. Board Group-II (2012-A))
17. State the role of skeletal system in mineral homeostasis. (D.G.K. Board Group-II (2012-A))
18. Explain briefly haptanastic movements with example. (D.G.K. Board Group-II (2012-A))
19. What is cartilage and where it is found? (D.G.K. Board Group-II (2012-A))
20. Differentiate between smooth and cardiac muscles. (D.G.K. Board Group-I (2013-A))
21. Explain process of ecdysis. (D.G.K. Board Group-I (2013-A))
22. What is rickets? Give its causes and cure.

- (D.G.K. Board Group-I (2013-
A)
23. What is Cramp? Give its causes.
(D.G.K. Board Group-II (2013-
A)
24. What are disadvantages of exoskeleton?
(D.G.K. Board Group-I (2013-
A)
25. What is Pulvinus?
(D.G.K Board-New Course-Group-I-2014-
A)
26. What is rigor mortis?
(D.G.K Board-New Course-Group-I-2014-
A)
27. Differentiate between plantigrades and
unguligrades.
(D.G.K Board-New Course-Group-I-2014-
A)
28. What is Rickets, give its causes.
(D.G.K Board-New Course-Group-II-2014-
A)
29. Compare epicuticle and procuticle.
(D.G.K Board-New Course-Group-II-2014-
A)
30. What is meant by disc slip?
(D.G.K Board-New Course-Group-II-2014-
A)
31. Give two differences between Tetany and Tetanous.
(D.G.K Board-New Course-Group-I-2015-
A)
32. Compare effective and recovery stroke in
Paramecium.
(D.G.K Board-New Course-Group-I-2015-
A)
33. What is T-system?
(D.G.K Board-New Course-Group-I-2015-
A)
34. Differentiate between epinasty and hyponasty.
(D.G.K Board-New Course-Group-II-2015-
A)
35. What are floating ribs?
(D.G.K Board-New Course-Group-II-2015-
A)
36. What are hinge joints, give an example.
(D.G.K Board-New Course-Group-II-2015-
A)

Answers

- Cartilage different from Bone: -**
See Bahawalpur Board Answer No: 9
- Antagonism: -**
See Bahawalpur Board Answer No: 20
- Movement of Starfish: -**
 - Star fish moves with the help of tube feet. Tube feet are present on both sides of radial canal that extends up to the tip of the arm. The tube feet extend when water is pumped into them, then they fix themselves by suction cup to some subject. Later on they shorten and pull the body in this direction. In this way starfish moves in any direction.
 - Starfish also swim with the help of arms.
- Microcephaly: -**

- It is a phenomenon of under-development of skull.
- It leads to small sized skull of the person.
- It is a genetic disease.
- Pulvinus: -**
 - It is a multicellular swelling located at the base of each leaf or leaflet. Or
It is the swollen portion of petiole.
 - It is composed of parenchyma cells with relatively large intercellular spaces and central strand of vascular tissues.
 - The changes in the leaf orientation, after exposure to a stimulus, are mostly associated with rapid turgor pressure changes in pulvinus.

6. Differences between Axial Skeleton and Appendicular Skeleton: -

Axial Skeleton	Appendicular Skeleton
<ol style="list-style-type: none"> It forms the axis of the body or it is located along the central axis of the body. The axial skeleton includes the skull, the vertebrae, the ribs and the sternum. It supports and protects the organs of head, neck and chest. A total of 80 bones make up the axial skeleton in humans. 	<ol style="list-style-type: none"> It forms a system of levers to provide mobility to the body. Appendicular skeleton includes the limbs and pectoral and pelvic girdles that attach them to the axial skeleton. The pectoral girdle and upper limbs are specialized for flexibility while pelvic girdle and lower limbs are specialized for strength. A total of 120 bones make up the appendicular skeleton in humans.

7. Two Changes in the Muscle due to Aerobic Exercise: -

- Capillaries surrounding the muscle fibers increase in number.
- Mitochondria within muscle fibers increase in number.

8. Pulvinus: -

See D.G.K. Board Answer No: 5

9. A) Tonoplast: -

The membrane that bounds plant vacuole is known as Tonoplast. OR
The vacuolar membrane is called tonoplast.

B) Function of Tonoplast:

Tonoplast contains a number of active transport systems that pump ions into the vacuole or vacuolar compartments despite the higher concentration than that of the extracellular fluid.

10. Differences between Tendon and Ligament: -

See Lahore Board Answer No: 6

11. Differences between Brachialis and Brachioradialis:

Brachialis	Brachioradialis
<ol style="list-style-type: none"> It is originated from the front of lower half of the humerus. It is inserted into ulna. It is a strong flexor of the elbow joint. 	<ol style="list-style-type: none"> It is originated from the lateral supracondylar ridge of humerus. It is inserted into radius. It flexes forearm at elbow joint; rotates forearm to the mid prone

	position.
--	-----------

12. Tetany: -

See Multan Board Answer 36

13. How Rickets Produced: -

Rickets occurs in growing children which constantly do not receive vitamin D. Deficiency of vitamin D decreases the absorption of calcium and phosphate

due to which many changes occur at the growing ends of long bones. The ends of bones become thick with irregular cartilage and poorly calcified and scanty bone formation. This failure of calcification in

newly formed bones gradually progresses with prolonged deficiency of vitamin D and take the place of older bones that are being absorbed. This results in

stunting growth and bowing of lower limbs called rickets.

14. Differences between Hinge Joints and Ball and Socket Joints: -

Hinge Joint	Ball and Socket Joint
1. These joints resemble the hinge on a door.	1. In ball and socket joints, a ball-shaped head of one bone fits in a socket like concavity of another.
2. It allows movement in two directions.	2. This allows movement in several directions.
3. Flexion and extension movements are possible.	3. Flexion, extension, medial rotation, lateral rotation etc. are possible.
4. At these joints, a pair of muscles is arranged in the same plane as that of joints.	4. Several pairs of muscles are attached to each of the bones of the joint usually perpendicular to each other.
5. Examples of hinge joints are elbow, knee and ankle joints.	5. The shoulder and hip joints are good examples of this type of joint.

15. Differences between Collenchyma from Parenchyma:

Collenchyma	Parenchyma
1. Collenchyma tissue is composed of cells which are usually elongated.	1. Parenchyma tissue is composed cells that are typically large and are commonly polyhedral (many-sided).
2. It has cells with a thicker primary cell wall. The thickness is uneven.	2. It has cells with a thin primary cell wall.
3. Cells in the collenchyma are usually grouped in strands or cylinders.	3. Parenchyma cells are loosely packed together, separated by a network of intracellular spaces.
4. Collenchyma is not found uniformly throughout the plant and often occurs near stem surfaces and along leaf veins.	4. Parenchyma tissue is found throughout the plant body.
5. It is an extremely flexible structural tissue that provides much of the support in soft, young, non-woody plant organs.	5. Parenchyma cells perform several important functions such as photosynthesis, storage, and secretion.

16. Epinasty leading to Opening of Buds:

Epinasty leads to opening of bud because of rapid growth of upper surface of leaf in bud condition as compared to the lower surface.

17. Role of Skeletal System in Mineral Homeostasis:

Bones serve as store house for calcium, phosphorous, sodium and potassium. Through negative feedback mechanisms, bones can release or take up minerals

to maintain homeostasis. OR
Bones are storage depots for calcium and phosphates, which can be exchanged with the plasma to maintain plasma concentrations of these electrolytes.

18. Haptonastic Movements with Example: -

See Lahore Board Answer No: 26

19. A) Cartilage: -

See Gujranwala Board Answer No: 8

B) Where Cartilage is Found: -

Cartilage covers ends of the bone at the joint, and

also supports the flexible portion of nose and external ears.

It also forms an external pinna (outer ear) of ear and epiglottis.

20. Differences between Smooth and Cardiac**Muscles:**

Smooth Muscles	Cardiac Muscles
1. These are the muscles of intestine, stomach, and other internal hollow organs and blood vessels.	1. These are the muscles of heart.
2. Their function is the movement of contents within hollow organs.	2. They pump blood.
3. Smooth muscles have spindle-shaped cells, each with a single nucleus. Cells are usually arranged in sheets.	3. Heart is composed of chains of single cell, each with its own nucleus. The chains of cells are organized into fibers that are branched and bound end to end at intercalated discs.
4. They are non-striated or un-striped.	4. They have irregular stripes.
5. Their speed of contraction is slow.	5. Their speed of contraction is intermediate.
6. Smooth thin filaments lack troponin.	6. Cardiac thin filaments contain troponin and tropomyosin.

21. The Process of Ecdysis: -

See Multan Board Answer No: 5

22. Rickets, Cause and Cure: -

See Lahore Board Answer No: 22

23. A) Cramp: -

1. It is commonly called a muscle pull.
2. It is also known as tetanic contraction of entire muscle.
3. It causes muscle to become taught and painful.
4. It lasts for just few seconds or several hours.
5. It is most common in thigh and hip muscles, usually occur at night or after exercise. OR

It is a type tetanic contraction which usually occurs in a limb muscle.

B) Causes of Cramp: -

See Exercise Answer No: 1

24. Disadvantages of Exoskeleton: -

See Faisalabad Board Answer No: 5

25. Pulvinus: -

See D.G.K. Board Answer No: 5

26. Rigor Mortis: -

Rigor mortis is the stiffness of body that begins 3 to 4 hours after death and completes in about 12 hours. During the next 48 to 60 hours, rigor mortis gradually subside as the proteins involved in rigor mortis begin

to degrade. Following death, cytosolic concentration of calcium begins to rise. This calcium moves the regulatory protein aside, letting actin bind with the myosin cross bridges, which were already charged with ATP before death. Dead cells cannot produce any

more ATP, so the actin and myosin, once bound, cannot detach, because they lack fresh ATP. The thick

and thin filaments stay linked by immobilized cross bridges, leaving dead muscles stiff.

27. Differences between Plantigrade and Digitigrade: -

See Multan Board Answer No: 7

28. Rickets and its Causes: -

See Lahore Board Answer No: 22 (A) and (B)

29. Comparison of Epicuticle and Procuticle: -

Epicuticle	Procuticle
1. It is the outer most layer of exoskeleton of arthropods.	1. It is the bulk of exoskeleton below epicuticle.
2. It is made up of waxy lipoprotein.	2. It is made up of chitin, tough, leathery, poly-saccharide and several kinds of proteins. It is also hardened by sclerotization and sometimes by impregnation with calcium carbonate.

30. Disc Slip:

- When cartilaginous ring of intervertebral disc ruptures and displaces and nucleus pulposus protrudes out then it is called disc slip or herniation of disc.
- Severe pain is generated due to pressure of nucleus pulposus on the spinal cord or spinal nerves. Un-ability to move is also the result of pressure of nucleus pulposus on the spinal nerve. Sciatica and osteoarthritis may develop due to herniation of disc.
- It occurs due to physical trauma to spines.
- It also occurs from bending forward while lifting a heavy object.
- It is treated with bed rest, traction and painkiller. If this fails disc may be removed surgically.

31. Two Differences between Tetany and Tetanus: -

Tetany	Tetanus
1. It is not an infectious disease and is caused by low calcium in the blood.	1. It is an acute infectious disease caused by anaerobic bacterium <i>Clostridium tetani</i> .
2. In tetany, muscle twitches and convulsion occurs. It does not cause lock jaw.	2. It causes painful spasm of some skeletal muscle often leading to lock jaw (fixed rigidity of jaws).

32. Comparison of Effective and Recovery Stroke in Paramecium: -

Effective Stroke	Recovery Stroke
1. In effective stroke, cilia bend or shorten.	1. In recovery stroke, cilia become straight.
2. Bending of a cilium occurs due to simultaneous contraction of its five out of nine (5/9) double fibrils.	2. Straightening of a cilium occurs due to simultaneous contraction of its four out of nine (4/9) double fibrils.

33. T-system: -

- T-system is a system of thousands of hollow, elongated transverse tubules (T-tubules) made by internal projection of sarcolemma of muscle fiber deep into the muscle cell.
- It extends and encircles myofibril at the level of Z-line or Aor I junction.
- Transverse tubules (T-tubule) are internal extension of cell membrane that run transverse in the myofibril.
- The T tubules, where they originate from the cell membrane, are open to the exterior. They communicate with the extracellular fluid surrounding the muscle fiber and they themselves also contain extracellular fluid in their lumen.
- T-tubule and terminal portion of the adjacent envelope of sarcoplasmic reticulum form triads at regular interval along the length of the fibril.
- The nerve impulse is carried through transverse tubule to the adjacent sarcoplasmic reticulum.

34. Differences between Epinasty and Hyponasty: -

See Gujranwala Board Answer No: 7

35. Floating Ribs: -

See Multan Board Answer No: 34

36. Hinge Joints With An Example: -

See Sargodha Board Answer No: 15

SAHIWAL BOARD QUESTIONS

- Define turgor pressure. Give its importance.
(Sahiwal Board (2013-
A)
- Differentiate between epinasty and hyponasty.
(Sahiwal Board (2013-
A)
- What is cartilage? Mention its types with examples.
(Sahiwal Board (2013-
A)
- Differentiate between Sclerenchymatous cells and collenchymatous cells.

- (Sahiwal Board (New Scheme) (2014-
A)
5. Name bones of human pectoral girdle.
(Sahiwal Board (New Scheme) (2014-
A)
6. Differentiate between cartilage and bone.
(Sahiwal Board (New Scheme) (2014-
A)
7. Give two adaptations in fish for swimming.
(Sahiwal Board-New Scheme-2015-
A)
8. What is Tetany?
(Sahiwal Board-New Scheme-2015-
A)
9. Define joints and give name on the basis of structure.
(Sahiwal Board-New Scheme-2015-
A)

Answers

1. **Turgor Pressure and its Importance:** -
See Sargodha Board Answer No: 11
2. **Differences between Epinasty and Hyponasty:** -
See Gujranwala Board Answer No: 7
3. **A) Cartilage:** -
See Gujranwala Board Answer No: 8
B) Types of Cartilage with Examples: -
See Lahore Board Answer No: 20
4. **Differences between Sclerenchymatous and Collenchymatous Cells:** -

Sclerenchymatous Cells	Collenchymatous Cells
1. They usually lack living protoplasts when they are mature. At functional maturity, when they are providing support they are often dead. 2. They form supporting tissue which imparts rigidity as well as strength. 3. Sclerenchyma cells have both primary walls and secondary walls. 4. Cell walls are uniformly thick. 5. They are unable to stretch or elongate. 6. Their secondary walls are impregnated with lignin. 7. They are mainly found in stems and midrib of leaves. They are less abundant in roots. 8. Their main function is to support the mature regions of a plant.	1. They have living protoplasts and may live for many years. 2. They form supporting tissue but imparts strength and flexibility. 3. They lack secondary cell wall. 4. They have unevenly thickened primary walls. 5. They can be stretched. They also elongate with the growth of stems and leaves. 6. They lack lignin. 7. They are found beneath the epidermis of stems or leaf petioles (stalk) and along veins in leaves. 8. They usually provide support to young herbaceous parts of the plants.

5. **Names of Bones of Human Pelvic Girdle:** -
See Rawalpindi Board Answer No: 4
6. **Differences between a Bone and Cartilage:** -
See Bahawalpur Board Answer No: 9
7. **Two Adaptations in Fish for Swimming:** -
1. Body of most of fishes is streamlined, being tapered at

- both ends due to which water flows readily over the body surface and dragging is reduced to a minimum. Faster the fish, the most perfect is the stream lined.
2. The dermal denticles of cartilaginous fish and scales of bony fish are kept moist by slimy exudation from mucous or oil glands that considerably reduces friction between fish and water.
8. **Tetany:** -
See Multan Board Answer No: 36
9. **A) Joint:** -
Joint is an articulation two bones of a skeleton.
Or
Junction between two or more bones of the skeleton is called joint.

B) Name on the Basis of Structure: -

1. **Fibrous Joints** --- Joints where short, tough, collagenous fibers link two bones.
2. **Cartilaginous Joints** --- Joints where the articulating bones are bound together by cartilage.
3. **Synovial Joints** --- Joints where two bones are separated by a cavity containing synovial fluid.

C h a p t e r ---- 17

COORDINATION AND CONTROL

3 SQs

1) From Exercise:-

Questions

- Define circadian rhythm.
- What is the difference between CNS and PNS?
- What are the functions of parathyroid gland?
- Define the term hormone.
- What are the commercial applications auxins?
- List different types of tropisms.
- Write a note on Alzheimer's disease.

Answers

- Circadian Rhythm:** -
Biorhythms which show periodicity of about 24-hours are called Circadian Rhythms.
It is also called diurnal rhythm.
It is usually about 24 hour in duration and can be reset or entrained.
It is in one's genes but the environment influences the rhythms to some extent.
- Circadian rhythms are controlled by an internal timing mechanism called a biological clock.
- Basic period of clock is innate. Ervin Bunnings has shown that exposure of fruitfly (*Drosophila*) to

constant conditions for 15 consecutive generations fails to eliminate the essential 24 hour rhythm of this insect.

2. Difference between CNS and PNS: -

CNS	PNS
1. CNS consists of a complex brain that is continuous with the dorsal tubular spinal cord. 2. It is located in the centre of the body. 3. It receives and processes incoming informations and determine appropriate responses.	1. PNS consists of the sensory receptors, the nerves that link these receptors with the CNS and the nerves that link the CNS with effectors (muscles and glands) 2. It is located in the peripheral regions of the body. 3. It transmits signals between CNS and rest of the body.

3. Functions of Parathyroid Gland: -

Parathyroid gland regulates blood calcium level.

OR

When the calcium level in the blood falls, parathyroid gland releases parathormone (PTH) which performs following functions:

1. It raises plasma calcium by withdrawing calcium from the bone.
2. It increases calcium reabsorption from the kidney tubules.
3. It increases intestinal absorption of calcium and phosphate.
4. It also activates vitamin D, which then increases the amount of calcium absorbed from intestine.

4. Hormone:

1. Hormones are organic compounds of varying structural complexity that are poured directly and are transported to blood to respective target tissue.
2. Hormones affect the target cells.
3. They do not initiate new biochemical reactions but produce their effects by regulating enzymatic and other chemical reactions, already present.
3. They may either stimulate or inhibit a function.
4. Hormones may also control some long term changes, such as rate of growth, rate of metabolic activity and sexual maturity.
5. Chemically hormones may be of following four types:
 - a. Proteins (e.g. insulin and glucagon)
 - b. Amino acids and derivatives (e.g. thyroxine epinephrine and norepinephrine).
 - c. Polypeptides (e.g. vasopressin or ADH and oxytocin)
 - d. Steroids (e.g. estrogens, testosterone, and cortisone). tissues called target tissues, because only these tissues have receptors for the hormone. Or
1. Hormones are organic compounds that are produced by endocrine (ductless) glands and released directly

into the circulation as blood passes through the glands.

2. Hormones are composed of amino acids, small polypeptides, protein, or steroid.
3. They are carried by the circulatory system to cells throughout the body.
4. Some hormones bind with receptors and initiate many reactions.
5. Some endocrine hormones affect most cells of the body. Such as growth hormones from the anterior pituitary gland causes growth in most parts of the body.
6. Most hormones affect only specific tissues called target tissues, because only these tissues have receptors for the hormone.

5. Commercial Applications of Auxins: -

1. A synthetic auxin 2,4 Dichlorophenoxy acetic acid (2,4 D) is a broad leaves (dicot) weed killer used in cereal crops and lawns to eliminate weeds.
2. Sprouting of potatoes is inhibited by 2,4 D.
3. 2, 4 D retards abscission or premature fruit drop.
4. Naphthlene acetic acid (NAA) and Indole propionic acid are usually used to stimulate natural fruit set but sometimes are used to cause fruit setting in the absence of pollination (parthenocarpy).

6. Different Types of Tropisms: -

1. Gravitropism --- The response of a plant to gravity
2. Phototropism ---- Directional growth of plant parts caused by light
3. Thigmotropism --- Unequal growth in response to a mechanical stimulus such as contact with a solid object
5. Chemotropism --- Movement in response to some chemicals
6. Hydrotropism ----The movement of plant parts in response to stimulus of water
4. Heliotropism ---- Ability of leaves and flowers of certain plants to follow the sun movement across the sky.

7. Alzheimer's Disease: -

1. Alzheimer's disease was first described by Alois Alzheimer in 1907.
2. It is characterized by the decline in brain function. There is also decline brain function with age.
3. Its symptoms are similar to those diseases that cause dementia (memory loss).
4. There is genetic predisposition to the disease in some people, so it tends to run in families.
5. There is also evidence that high level of aluminium may contribute to the onset of disease.

II) From Punjab Boards:-

LAHORE BOARD QUESTIONS

1. What results in biorhythms? (Lahore Board 2008-A)
2. What are the effects of low and high concentration of parathormone? (Lahore Board 2008-A)
3. What is imprinting? (Lahore Board 2008-A)

4. What are galls and calluses? (Lahore Board 2009-A)
5. What are axons and dendrites? (Lahore Board 2009-A)
6. What is epilepsy? (Lahore Board 2009-A)
7. What is imprinting? (Lahore Board 2010-A)
8. Name the two hormones of gut. (Lahore Board 2010-A)
9. How axon differs from Dendron? (Lahore Board 2010-A)
10. Define saltatory impulse and synapse. (Lahore Board 2011-A)
11. Give effects of nicotine on blood vascular system and digestive system in man. (Lahore Board 2011-A)
12. Give two commercial applications of gibberellins. (Lahore Board 2011-A)
13. What is difference between CNS and PNS? (Lahore Board Group-I-2012-A)
14. Explain imprinting. (Lahore Board Group I-2012-A)
15. What is epilepsy? (Lahore Board Group-I-2012-A)
16. Explain Reflex arc. (Lahore Board Group-II-2012-A)
17. Define term hormone, give one example. (Lahore Board Group-I-2012-A)
18. What is Parkinson's disease? (Lahore Board Group-II-2012-A)
19. What are Gastrin and Secretin? (Lahore Board Group-I-2013-A)
20. Write symptoms of Alzheimer's disease. (Lahore Board Group-I-2013-A)
21. Explain the function of hormones secreted by Islets of Langerhans. (Lahore Board Group-II-2013-A)
22. What is habituation? Give an example. (Lahore Board Group-II-2013-A)
23. Differentiate between biorhythms and diurnal rhythms. (Lahore Board (Session 2012-14) Group -I-2014-A)
24. Give role of 1, 2 dichlorophenoxy acetic acid. (Lahore Board (Session 2012-14) Group -I-2014-A)
25. Write functions of photoreceptors and nociceptors.

- (Lahore Board (Session 2012-14) Group -I-2014-A)
26. What is Reflex arc? (Lahore Board (Session 2012-14) Group - II-2014-A)
27. Give two commercial applications of Gibberellins. (Lahore Board (Session 2012-14) Group - II-2014-A)
28. How Axons differ from Dendron? (Lahore Board (Session 2012-14) Group - II-2014-A)

Answers

1. Biorhythm May be the Result Of: -

- Biorhythm may be the result of the following:
1. There may be direct response to various changes in the external (exogenous) stimuli.
 2. There may be internal (endogenous) rhythm that progresses the organism's behavior in synchronicity with exogenous temporal period of 24 hour or 365 day period.
 3. The synchronization mechanism may be a combination of 1 and 2. Or
 1. Some rhythms are exogenous or driven solely by external events.
 2. Most rhythms are endogenous meaning they are of internal origin.
 3. Many of these rhythms are driven by an internal clock (endogenous) whose setting may be modified by external changes (exogenous).

2. A) The Effects of Low Concentration of Parathormone:

Low concentration of parathormone causes a drop in blood calcium ions which in turn leads to muscular tetany.

B) The Effects of High Concentration of Parathormone:

High Concentration of parathormone leads to a progressive demineralization of the bones similar to rickets, as well as to the formation of massive kidney stones.

3. Imprinting: -

1. Imprinting is a form of learning which is best known in birds such as geese, ducks, and chickens, which are all precocial birds.
2. Shortly after hatching, ducklings and other young birds have tendency to follow moving objects in their surroundings.
3. Young birds show a brief sensitive period during

- which the shape and form of the objects can be imprinted, with the result that they will follow them.
3. A young bird, in the absence of its mother, may print

on other species of birds, human beings, or inanimate objects.

4. A) Galls: -

- Galls are growths on a plant that are induced by parasites.
- Tumors or crown galls are usually highly organized growths and less differentiated than other types of galls. They are induced by bacteria.

B) Calluses:

If a vascular plant is damaged the wound becomes plugged by a mass of undifferentiated parenchyma cells called callus tissue and/or protective chemicals such as resins which prevent the entry of microorganisms.

5. A) Axons: -

- Axon is a long cytoplasmic process which conducts nerve impulse away from the cell body or soma.
- It may be more than a meter long in some neurons.
- It usually arises opposite to dendrites.
- It ends in a knob like structures, the axon terminals.
- The axons of some neurons are covered by a myelin sheath.

B) Dendrites: -

- Dendrites are short, highly branched processes that receive signals from the sensory receptors or other neurons and transmit them to the cell body.
- Dendrites conduct nerve impulse towards the cell body.
- In most neurons the plasma membrane of dendrites and cell body contains protein receptors for binding chemical messengers from other neurons.

6. Epilepsy: -

- Epilepsy is one of the convulsive disorders of nerves which are characterized by abrupt transient symptoms

of motor, sensory, psychic or autonomic nature, frequently associated with changes in consciousness. The changes are believed to be secondary to sudden transient alterations in brain function associated with excessive rapid electrical discharges in gray matter.

- The onset of epilepsy is usually before age of 30. Later age onset suggests organic disease.
- In some patients emotional disturbances play a significant trigger role. Alcohol aggravates epilepsy.
- Electroencephalography is the most important test in the study of epilepsy.

7. Imprinting: -

See Lahore Board Answer No: 3

8. Names of Two Hormones of Gut: -

- Gastrin
- Secretin

9. Axon Different from Dendron: -

Axon	Dendron
1. Axon is a long cytoplasmic process which conducts nerve impulse away from the cell body or soma.	1. It is single fiber of neuron which conducts nerve impulse towards the cell body.
	2. It is found only in

2. It is found in sensory, motor and associative neurons.

sensory neurons.

10. A) Saltatory Impulse: -

In myelinated neurons the nerve impulse jumps from

node to node (node of Ranvier). This is called Saltatory impulse.

B) Synapse: -

Consecutive neurons are so arranged that the axon endings of one neuron are connected to the dendrites of the next neuron. There is no cytoplasmic connection between the two neurons and

microscopic

gaps are left between them. Each of these contact point is called synapse.

11. A) Effects of Nicotine on Blood Vascular System in Man: -

It increases heart beat and narrows blood vessels (raises blood pressure).

B) Effects of Nicotine on Digestive System in Man: -

1. It increases digestive tract mobility.
2. Nicotine may even occasionally induce vomiting and/or diarrhea. OR

It increases gastrointestinal activity.

12. Two Commercial Applications of Gibberellins: -

1. They are used to delay ripening and improve storage life of bananas and grape fruit.
2. G3 is used in brewing industry to stimulate α -

amylase

production in barley and this promotes malting. Or

1. They are used to break dormancy of buds and bring about the onset of flowering in many plants.
2. Gibberellins are used to induce the growth of plants and increase the size of flowers.

13. Difference between CNS and PNS: -

See Exercise Chapter No: 17 Answer No: 2

14. Imprinting: -

See Lahore Board Answer No: 3

15. Epilepsy: -

See Lahore Board Answer No: 6

16. Reflex Arc: -

1. Reflex arc is the pathway of passage of impulse during a reflex action.
2. The direction of nerve impulse in a reflex arc is usually from receptors to sensory neuron to associative (association/relay) neuron and then through motor neuron to the effectors.
3. The knee-jerk reflex arc involves only two neuron, a sensory and the other motor neuron whose soma lie

in the spinal cord.

17. Hormone, with One Example:-

See Exercise Chapter No: 17 Answer No: 4

18. Parkinson's Disease: -

1. It is a nervous disorder, characterized by involuntary tremors, diminished motor power and rigidity.
2. In Parkinson's disease mental faculties are not affected.
3. It is caused by cell death in a brain area that produces dopamine. The disease may result by head trauma.
4. Onset of disease is usually in 50's and 60's. It progresses slowly and the patient may live for many

years.
5. L.dopa is the effective drug for the treatment of Parkinson's disease. A naturally occurring protein called glial cell-line derived neurotrophic factor (GDNF) may be used in near future for humans in the treatment of Parkinson.

19. A) Gastrin: -

1. It is the hormone produced by mucosa of pyloric region of the stomach.
2. It is produced under the influence of protein food in the stomach after it is partially digested.
3. It stimulates the secretion of gastric juice.

B) Secretin: -

1. It is produced from the duodenum.
2. It is produced when the acidic food touches the lining of the duodenum.
3. It affects the pancreas to produce and release pancreatic juice.
4. It also affects the rate of bile production in the liver.

20. Symptoms of Alzheimer's Disease: -

Its symptoms are similar to those diseases that cause dementia (memory loss). Or
In early stages, only short term memory is impaired, but as disease progresses even firm long term memories are lost. Higher mental abilities gradually deteriorate as the patient loses the ability to read, write and calculate. Language ability and speech are severely affected, and patients usually die 4 to 12 years after the onset of the disease.

21. Function of Hormones Secreted by Islets of Langerhans:

1. Glucagon: -

- a. It breaks down glycogen to glucose in the liver, leading to a rise in blood glucose.
- b. It also increases the rate of breakdown of fats.

2. Insulin:

1. It increases glycogen synthesis.
2. It increases cell utilization of glucose.
3. It stimulates conversion of glucose into lipid and protein.
4. It inhibits the hydrolysis of glycogen in the liver and muscle. Or

a. Actions on carbohydrates:

1. It facilitates glucose transport into most cells.
2. It stimulates gluconeogenesis (the production of glycogen from glucose) in muscles and liver.
3. It inhibits glycogenolysis (breakdown of glycogen into glucose).
4. It inhibits gluconeogenesis (conversion of amino acids into glucose) in the liver.

b. Actions on Fat:

1. It enhances the entry of fatty acids from the blood into the adipose tissue cells.
2. It increases the transport of glucose into adipose tissue cells where it serves as a precursor for the formation of fatty acids and glycerol.
3. It promotes chemical reactions for synthesis of triglyceride.
4. It inhibits lipolysis (fat breakdown).

c. Actions on Protein:

1. It promotes the active transport of amino acids into muscles and other tissues.
2. It increases the rate of amino acids incorporation into protein.
3. It inhibits protein degradation.

22. Habituation with an Example: -

1. Habituation is the simplest form of learning
2. It involves modification of behavior through a dediminution of response to repeated stimuli.
3. A loss of receptivity to repetitious stimuli can be useful in preventing a drain of energy and attention for trivial purposes.

Example:

Rodents respond to alarm calls by others in their group, if these calls are continued and no dangered is conferred, further calls may be ignored.

23. Differences between Biorhythms and Diurnal Rhythms:

Biorhythms	Diurnal Rhythms
These are behavioral activities that show the periodicity of about 24 hours or 365 days.	They have periods of about a day or 24 hour.

24. Role of 1, 2 Dichlorophenoxy Acetic Acid:

1. It is a broad leaves (dicot) weed killer used in cereal crops and lawns to eliminate weeds.
2. It inhibits sprouting of potatoes.
3. It retards abscission or premature fruit drop.

25. A) Functions of Photoreceptors: -

These respond to stimuli of light for example in eyes, rods and cones. Or
They transduce the energy from light into the energy of nerve impulses and produce sense of sight.

Or
Photoreceptors (rod and cone cells of retina) transform the light energy into electrical signals for transmission to the CNS.

B) Nociceptors: -

They produce sensation of pain. Or
They detect tissue damage. Or
Nociceptors detect detect tissue damage such as pinching or burning or distortion of tissue

26. Reflex Arc:

1. Reflex arc is the pathway of immediate and automatic involuntary responses called reflex actions.

2. Reflex arc typically includes five basic components:
 a. Receptor
 b. Afferent pathway (sensory neurons)
 c. Integrating centre (CNS)
 d. Efferent pathway (motor neurons)
 e. Effector (muscle or gland)
 3. In reflex arc, the pathway of nerve impulse is from receptor to sensory neuron to associative neuron and then through motor neurons to the effectors.

27. Two Commercial Applications of Gibberellins:

See Lahore Board Answer No: 12

28. Axon Different from Dendron: -

See Lahore Board Answer No: 9

GUJRANWALA BOARD QUESTIONS

1. What is meant by circadian rhythm?
 (Gujranwala Board 2008-A)
 2. What is parasympathetic nervous system?
 (Gujranwala Board 2008-A)
 3. What are commercial applications of Ethene?
 (Gujranwala Board 2008-A)
 4. Write down the commercial applications cytokinins.
 (Gujranwala Board 2009-A)
 5. Define circadian rhythm. (Gujranwala Board 2009-A)
 6. Differentiate between instinctive behavior from learning behavior. (Gujranwala Board 2010-A)
 7. Give similarities between nervous and chemical coordination. (Gujranwala Board 2010-A)
 8. What are androgens? (Gujranwala Board 2010-A)
 9. Give two commercial applications of ethene.
 (Gujranwala Board 2011-A)
 10. What is meant by resting membrane potential.
 (Gujranwala Board 2011-A)
 11. Explain effectors with an example.
 (Gujranwala Board 2012-A)
 12. What are the functions of parathyroid glands?
 (Gujranwala Board 2012-A)
 13. Discuss the role of two hormones produced by gut.
 (Gujranwala Board 2012-A)
 14. Name the synthetic auxin used as selective week killer.
 (Gujranwala Board 2013-A)
 15. Define 'Nissl's Granules. (Gujranwala Board 2013-A)
 16. Define effectors. Give their examples.
 (Gujranwala Board (New Scheme) (2014-A)
 17. What are commercial applications of Gibberellins.
 (Gujranwala Board (New Scheme) (2014-A)
 18. How Axons differ from Dendron?
 (Gujranwala Board (New Scheme) (2014-A)
 19. Differentiate between nerve impulse and saltatory impulse. (Gujranwala Board (New Scheme) (2014-A)
 20. What are neurotransmitters?

(Gujranwala Board (New Scheme) (2014-

- A)
 21. What are commercial applications of ethane? Quote any two. (Gujranwala Board-New Scheme-2015-A)
 22. Differentiate between axons and dendrites.
 (Gujranwala Board-New Scheme-2015-A)
 23. What is meant by division of labour?
 (Gujranwala Board-New Scheme-2015-A)

Answers

1. Circadian Rhythm: -

1. A biological rhythm with a 24-hour cycle is called a Circadian Rhythm.
 2. It is also called diurnal rhythm.
 3. It is in one's genes but the environment influences the rhythms to some extent.
 4. Circadian rhythms are controlled by an internal timing mechanism called a biological clock.
 5. Basic period of clock is innate. Ervin Bunnings has shown that exposure of fruitfly (*Drosophila*) to constant conditions for 15 consecutive generations fails to eliminate the essential 24 hour

2. Parasympathetic Nervous System: -

1. A few cranial nerves including the vagus nerves form the bottom portion of spinal cord, form the parasympathetic nervous system.
 2. It promotes all internal responses which are associated with relaxed state i.e. contraction of pupils, promotes digestion of food, retards heart beat etc.
3. Commercial Applications of Ethene:
 1. It induces flowering in pineapple.
 2. It stimulates ripening of tomatoes and citrus fruit.
 3. The commercial compound ethephone breaks down to release ethene in plants and is applied to rubber plant to stimulate the flow of latex.

4. Commercial Applications of Cytokinins: -

1. Cytokinins delay aging of fresh leaf crops (delay of senescence) such as cabbage and lettuce.
 2. They keep flowers fresh.
 3. They can also be used to break dormancy of some seeds.

5. Circadian Rhythm: -

See Exercise Chapter No: 17 Answer No: 1

6. Differences between Instinctive Behavior and Learning Behavior: -

Instinctive Behavior	Learning Behavior
1. It is not capable of modification.	1. It is the modification of behavior.
2. It is inborn, genetically inherited.	2. The capacity to learn is inherited.
3. It is performed for the first time, without previous experience.	3. Previous experience has an obvious influence on this type of behavior.
4. It depends on the	4. It depends on the

selection operating during the history of species.
5. It is found in animals with short life span and with little or no parental care.
6. It evolves gradually and slowly in the species.
7. Honebees inherit the tendency to fly towards flowers to seek nectar and pollen.

selection operating during the history of individual (during animal's life time).
5. It is found in animals which have long life span and parental care.
6. It evolves during the life history of an animal but ability to learn depends on heredity material of the animal.
7. Cat learns to press the lever to open the door of the cage in trial and error learning.

7. Similarities between Nervous and Chemical Coordination: -

- Both help in coordination of body.
- Both are homeostatic in function.
- Both release the chemicals in extra cellular spaces of the body.
- Both function in response to specific stimuli either from within the body or from the external environment. Or
- Both are means of coordination.
- Both are involved in homeostasis.
- Both hormone producing cells and nerve cells (neurons) synthesize chemical messenger which are released in extracellular spaces of the body.
- Both operate under the influence of external or internal stimuli.

8. Androgens: -

- Androgens cause development of the secondary characteristics.
- A very small amounts of androgens are secreted in both male and female by adrenal glands.
- A tumor on the inner part of the adrenal cortex in a female can cause excess of androgens to be produced

and thus the development of certain male characteristics. Such cases are very rare. Or

- The term androgen means any steroid hormone that has masculinizing effects i. e. it produces increased muscle mass in males.
- Androgens are male sex hormones.
- Testosterone is the principal androgen or male sex hormone which is produced by interstitial cells between the seminiferous tubules in the testes. It is responsible for primary and secondary sexual characteristics. It also stimulates spermatogenesis at puberty.
- Androgen also includes male sex hormones produced elsewhere in the body besides the testes.

- A very small amounts of androgens are secreted in both male and female by adrenal glands.

9. Two Commercial Applications of Ethene: -

- It induces flowering in pineapple.
- It stimulates ripening of tomatoes and citrus fruit.

10. Resting Membrane Potential: -

- A typical neuron at rest is more positive

electrically outside than inside the cell membrane.

This net difference in charge between inner and outer surface of a non-conducting neuron is called

the resting membrane potential.

- The resting membrane potential of a typical neuron is -70 mv.

11. Effectors with an Example: -

Effectors are the structures which respond when they are stimulated by impulse coming via motor neuron. The principle effectors are glands, which respond by secreting and muscles which respond by contracting.

2. Functions of Parathyroid Glands: -

See Exercise Chapter No: 17 Answer No: 3

13. Role of Two Hormones produced by Gut: -

See Lahore Board Answer No: 18

14. Name of the Synthetic Auxin Used as Selective Weed Killer: -

2, 4 Dichlorophenoxy Acetic Acid

15. Nissl's Granules: -

Nissl's granules are groups of ribosomes associated with rough endoplasmic reticulum and Golgi apparatus which are present in the cell body.

Or

Nissl's granules are really groups of ribosomes concerned with proteins. These are present in the cytoplasm of neurons (nerve cells).

16. Effectors with Examples: -

Glands and muscles are called effectors because they go into action (i.e. respond) when they receive nerve impulses or hormones.

Examples:

- The biceps is an effector which flexes the arm.
- Salivary gland is an effector which produces saliva when it receives a nerve impulse from the brain.

17. Commercial Applications of Gibberellins: -

- They are used to delay ripening and improve storage life of bananas and grape fruit.
- G₃ is used in brewing industry to stimulate α -amylase production in barley and this promotes malting.
- They promote fruit setting e.g. in tangerines and pears and are used for growing seedless grapes (parthenocarpy) and also increase the berry size.
- Applications of gibberellins increase the space between grapes. Hence they have been successfully used to produce larger seedless grapes.

18. Axons different from Dendron: -

See Lahore Board Answer No: 9

19. Differences between Nerve Impulse and Saltatory Impulse: -

Nerve Impulse	Saltatory Impulse
1. It occurs in unmyelinated fibers.	1. It occurs in myelinated fibers.
2. In ordinary nerve impulse, action potentials are generated within every	2. In saltatory impulse, action potentials occur only at nodes, and are

section of an unmyelinated axonal membrane from beginning to end.	conducted from node to node. So saltatory impulse jumps from node to node skipping over the myelinated sections of the axon.
3. It travels slowly at the speed of about 1 to 10 meter per second.	3. Its velocity is 5 to 50 fold faster than nerve impulse.

20. Neurotransmitters: -

1. Neurotransmitters are chemicals which are released at the axon ending of the neurons at synapse.
2. Many different types of neurotransmitters are known.

These are acetylcholine, adrenaline, nor-epinephrine, serotonin and dopamine.

3. Acetylcholine is the main neurotransmitter for synapses that lie outside the central nervous system.
4. Others are mostly involved in synaptic transmission within the brain and spinal cord.

21. Two Commercial Applications of Ethene: -

See Gujranwala Board Answer No: 9

22. Differences Between Axons and Dendrites: -

Axons	Dendrites
1. Axons are long, un-branched, single cytoplasmic process (fiber) of neurons.	1. Dendrites are typically, short, numerous, highly branched cytoplasmic processes (fibers) of neurons.
2. They conduct nerve impulse away from the cell body or soma.	2. They conduct nerve impulse towards the cell body or soma.
3. They are specialized for conducting impulses to other neurons or effectors.	3. They are specialized to receive stimuli and send signals to the cell body.
4. Axons are usually covered by a myelin sheath.	4. They are not covered by myelin sheath.

23. Division of Labour: -**MULTAN BOARD QUESTIONS**

1. What are Pacinian Corpuscles? Give their functions. (Multan Board 2008-A)
2. Differentiate between innate and learning behavior. (Multan Board 2008-A)
3. Differentiate between Dendrites and Dendron. (Multan Board 2008-A)
4. Write about Biorhythms. (Multan Board 2008-S)
5. Write about Parkinson's disease. (Multan Board 2008-S)
6. Write about imprinting. (Multan Board 2008-S)
7. Give two basic differences between nervous coordination and chemical coordination. (Multan Board 2009-A)

8. What are the commercial applications of Auxins? (Multan Board 2009-A)
9. Describe briefly about Parkinson's disease. (Multan Board 2009-A)
10. Write commercial applications of Ethene. (Multan Board 2009-S)
11. What is the effect of over secretion of thyroxine? (Multan Board 2009-S)
12. Define feed back mechanism. (Multan Board 2009-S)
13. What is epilepsy. (Multan Board 2010-A)
14. Define feed back mechanism. (Multan Board 2010-A)
15. What is Neuroglia? (Multan Board 2010-A)
16. Give commercial applications of Ethene. (Multan Board 2010-S)
17. Differentiate between Pacinians corpuscles and Meisner's corpuscles. (Multan Board 2010-S)
18. Write two similarities of nervous and chemical coordination. (Multan Board 2010-S)
19. Write down the commercial applications of Gibberellins. (Multan Board 2011-A)
20. What are Effectors? Give examples. (Multan Board 2011-A)
21. Differentiate between Etiolation and Chlorosis. (Multan Board 2011-A)
22. What is Cushing's disease? Give its symptoms. (Multan Board 2011-S)
23. Differentiate between Kineses and Taxes. (Multan Board 2011-S)
24. Differentiate between reflex action and reflex arc. (Multan Board 2011-S)
25. What is Circannual Rhythm? (Multan Board 2012-A)
26. How brain is protected with various covers? (Multan Board 2012-A)
27. Give the names of structural components of Limbic System. (Multan Board 2012-A)
28. Give the role of insulin and glucagon. (Multan Board 2012-S)
29. Write note on Alzheimer's disease. (Multan Board 2012-S)
30. Differentiate between Kineses and Taxes. (Multan Board 2012-S)

31. Differentiate between CNS and PNS.
(Multan Board 2013-
A)
32. Define Feedback Mechanism.
(Multan Board 2013-
A)
33. Define Apical Dominance.
(Multan Board (New Scheme) 2014-
A)
34. Differentiate between Kineses and Taxes.
(Multan Board (New Scheme) 2014-
A)
35. Give functions of Hypothalamus.
(Multan Board (New Scheme) 2014-
A)
36. What are Neurotransmitters? Give their various types.
(Multan Board (New Scheme) 2014-
A)
37. What are Diurnal Rhythms?
(Multan Board (Old Scheme) 2014-
A)
38. What is Limbic System?
(Multan Board (Old Scheme) 2014-
A)
39. Give functions of Oxytocin Hormone.
(Multan Board (Old Scheme) 2014-
A)
40. What are Neurotransmitters? Give two examples.
(Multan Board-New Scheme-2015-
A)
41. Define Neuroglia with its functions.
(Multan Board-New Scheme-2015-
A)
42. What are Pacinian Corpuscles?
(Multan Board-New Scheme-2015-
A)

Answers

1. A) Pacinian Corpuscles: -

1. They are encapsulated.
2. They are situated quite deep in the body.
3. They are also located in the limbs.

B) Functions of Pacinian Corpuscles: -

They receive deep pressure stimuli. They probably form a basis for vibration sense.

2. Differences between Innate and Learning Behavior:

See Gujranwala Board Answer No: 6

3. Differentiate between Dendrites and Dendron: -

Dendrites	Dendron
1. Dendrites are typically, short, numerous, highly branched processes specialized to receive stimuli and send signals to the cell body.	1. It is single fiber of neuron which conducts nerve impulse towards the cell body.
2. They arise from the cell bodies of all neurons i.e. sensory, motor and associative neurons.	2. It arises from the cell body of only sensory neurons.

4. Biorhythms: -

1. In living organisms, the behavioral activities occur at

- regular intervals which are called Biorhythms or biological rhythms.
2. The organisms come across environmental changes that are cyclic in nature such as days, tides, and seasons.
 3. Many organisms maintain internal rhythm or clock, to predict the onset of the periodic changes and to keep them prepared for these changes. Basic period of the clock is innate.
 4. Biorhythms may be exogenous, or endogenous or combination of both.
 5. The rhythms are in one's genes but the environment influences the rhythms to some extent. Thus timing of behavior results from a combination of effects of rhythmic internal processes and timed events of the environment.
 6. Rhythms may be circadian (showing periodicity of 24 hours) or circannual (showing periodicity of 365 days).
- 5. Parkinson's Disease: -**
1. Parkinson's disease (PD) is caused due to degeneration of particular dopamine releasing neurons in the region of basal ganglia.
 2. It is characterized by muscular rigidity and involuntary tremors at rest such as involuntary shaking of the hands or head.
 3. The intellect remains unaffected until late in the disease.
 4. It is treated with L-dopa (an acronym for dihydroxyphenylalanine), a precursor from which dopamine can be produced.

6. Imprinting:

See Lahore Board Answer No: 3

7. Two Basic Differences between Nervous coordination and Chemical Coordination: -

Nervous Coordination	Chemical Coordination
1. It has short-lived effects.	1. It has long term effects.
2. Communication is electro-chemical (impulses and neurotransmitters).	2. Communication is purely chemical (hormones).

8. The Commercial Applications of Auxins: -

See Exercise Chapter No: 17 Answer No: 5

9. Describe briefly about Parkinson's Disease: -

See Lahore Board Answer No: 18

10. Commercial Applications of Ethene: -

See Gujranwala Board Answer No: 3

11. The Effects of Over Secretion of Thyroxine: -

Excessive thyroxine produces a condition called Grave's disease with exophthalmic goiter and increase in the basal metabolic rate. This can lead to cardiac failure if prolonged.

12. Feedback Mechanism: -

1. It is a type of mechanism in which controlling mechanism is itself controlled by the products of

- reactions it is controlling.
2. An example of feedback in hormones is as follows:
 - a. Low body temperature or stress stimulates neurosecretory cells of the hypothalamus to release TRF which acts on anterior pituitary to release TSH.
 - b. TSH stimulates the thyroid gland to secrete thyroxine.
 - c. Thyroxine causes an increase in the metabolic activity of most body cells, generating ATP energy and heat.
 - d. Both raised body temperature and higher thyroxine levels in the blood inhibit the releasing hormone cells and the TSH-producing cells.

13. Epilepsy: -

See Lahore Board Answer No: 6

14. Feedback Mechanism: -

See Multan Board Answer No: 12

15. Neuroglia: -

1. In higher animals and in humans, neuroglia or glial cells are the cells other than neurons which make up as much as half of the nervous system.
2. They play a vital role in the nutrition of neurons and their protection by myelin sheath.

16. Commercial Applications of Ethene: -

See Gujranwala Board Answer No: 3

17. Differences between Pacinian Corpuscles and Meisner's Corpuscles:

Pacinian Corpuscles	Meisner's Corpuscles
<ol style="list-style-type: none"> 1. Pacinian corpuscles are encapsulated corpuscles in which the nerve ending is surrounded in concentric, onion-like layers of membranes alternating with fluid filled spaces. 2. They lie deep below the skin in the subcutaneous tissue. 3. They are particularly important for detecting vibration or other changes in mechanical state of tissues. 	<ol style="list-style-type: none"> 1. Meisner's corpuscles are encapsulated corpuscles in which nerve endings are spiral and much twisted, each of which ends in a knob. 2. These are present on body surfaces that do not contain hair such as finger tips, lips, nipples, palm, soles etc. 3. They are particularly sensitive to movement of objects over the surface of skin as well as to low-frequency vibration.

18. Two Similarities of Nervous and Chemical Coordination: -

1. Both are means of coordination.
2. Both operate under the influence of external or internal stimuli.

19. The Commercial Applications of Gibberellins: -

See Gujranwala Board Answer No: 17

20. Effectors with Examples: -

See Gujranwala Board Answer No: 11

21. Differences between Etiolation and Chlorosis: -

Etiolation	Chlorosis
<ol style="list-style-type: none"> 1. It is the condition which develops in plants when they are grown in dark (without light). 2. In this condition, the stem becomes tall, weak 	<ol style="list-style-type: none"> 1. It is the condition which develops in plants when they are grown in the soil with short supplies of mineral nutrients. 2. In this condition,

and spindly, the distance between successive nodes being greater than usual; leaves are yellow due to lack of chlorophyll, remain small and fail to expand.

3. It is caused by a lack of red light.
4. Etiolated plants become normal when exposed to red light.

leaves turn yellow due to lack of chlorophyll.

3. It is caused by short supply of iron and magnesium in the soil.
4. They become normal when sufficient amounts of iron and magnesium are supplied.

22. A) Cushing Disease: -

1. It is the reverse of Addison's disease.
2. In Cushing's disease, too much cortical hormone is produced.

B) Symptoms of Cushing Disease: -

Symptoms are an excessive protein breakdown resulting muscular and bone weakness. The high blood sugar disturbs the metabolism as in diabetes.

Or

A) Cushing Disease: -

1. When the level of adrenal cortex hormones is high due

to hypersecretion, a person develops Cushing syndrome.

2. Hypersecretion of adrenal cortex hormones (e.g. cortisol) leads to excessive gluconeogenesis (conversion of amino acids into glucose) When too many amino acids are converted into glucose, the body suffers from combined:

a. Glucose excess (high blood glucose): -

Blood glucose level rises to as much as 50 % above normal, causing adrenal cortex diabetes.

b. Protein shortage: -

- i. Loss of muscle protein leads to muscle weakness and fatigue.
- ii. The loss of protein synthesis in the lymphoid tissues leads to a suppressed immune system, so many of these patients die of infections.
- iii. Severe diminished protein deposition in the bones often causes severe osteoporosis with consequent weakness of the bones.

B) Symptoms of Cushing Disease: -

Symptoms of Cushing disease include hypertension, high glucose level, moon face and buffalo torso.

23. Differences between Kineses and Taxes: -

Kineses	Taxes
<ol style="list-style-type: none"> 1. In kinesis intensity of the stimulus rather than its direction governs the response of the animal. 2. Response is also non-directional. Stimulus changes the rate of activity not direction of the movement such as speed of the random movement or frequency of turning or both. 	<ol style="list-style-type: none"> 1. In taxes direction of the stimulus governs the response of the animal. 2. Response is also directional, i.e. movement of the animal, either towards or away from the stimulus.
Examples: -	Examples:
	<ol style="list-style-type: none"> 1. Daphnia (water flea) shows positive phototaxis, moving towards light. 2. Male silkworm show

1. Wood-lice move about quickly in dry conditions but slow down and stop in humid area.	positive chemotaxis, moving towards pheromone secreted by male.
2. Slaters respond to low humidity by slowing their rate of movement and their rate of turning.	3. Earthworms, centipedes, and slaters show negative phototaxis, moving away from light.

24. Differences between Reflex Action and Reflex Arc:

Reflex Action	Reflex Arc
It is an automatic, involuntary action which occurs due to external and internal stimuli.	It is the pathway of passage of nerve impulse during a reflex action.

25. Circannual Rhythm: -

1. If the biorhythms are of about 365 days, these rhythms in activity are called Circannual.
2. These are also called annual rhythms.
3. Circannual clocks must be reset by external rhythms.
4. It is believed that annual environmental cue is the rhythmic variation in photoperiod (length of the day).

26. Protection of Brain: -

1. Brain is protected by cranium, a part of skull.
2. It is also protected by triple layers of meninges in which CSF is present which acts as cushion against jumps and jolts. Or
1. Brain is protected in bony armour, the cranium (a part of skull).
2. Another protection inside the bony armour is offered by three tough connective tissue covers called meninges.
3. A plasma like fluid, the cerebrospinal fluid (CSF) bathing neurons of brain is yet another protection to brain.

27. Names of Structural Components of Limbic System:

1. Hypothalamus
2. Amygdala
3. Hippocampus

28. Role of Insulin and Glucagon: -

See Lahore Board Answer No: 21

29. Alzheimer's Disease: -

See Exercise Chapter No: 17 Answer No: 7

30. Differences between Kineses and Taxes: -

See Multan Board Answer No: 23

31. Differences between CNS and PNS: -

See Exercise Chapter No: 17 Answer No: 2

32. Feedback Mechanism: -

1. It is a type of mechanism in which controlling mechanism is itself controlled by the products of reactions it is controlling. Or Detection of change and signaling for the effector's response to control system is a feedback mechanism.
2. In human body many feedback mechanisms are operating for maintaining the products in the body into

certain limits.. If there are accelerators there must be inhibitors. Body temperature as well as hormonal secretions are regulated by feedback mechanism.

3. It has been observed that there could be negative as well as positive feedbacks.

a. Negative feedback:

- i. The feedback is said to be negative feedback if further secretion of hormone is inhibited.
- ii. Negative feedback opposes an initial change and is widely used to maintain homeostasis.

b. Positive feedback:

- i. It refers to the series of similar effects produced, which leads to the enhancement of the change under consideration.
 - ii. Positive feedback enhances an initial change.
4. An example of negative feedback in hormonal system is as follows:
 - a. Low body temperature or stress stimulates neurosecretory cells of the hypothalamus to release TRF which acts on anterior pituitary to release TSH.
 - b. TSH stimulates the thyroid gland to secrete thyroxine.
 - c. Thyroxine causes an increase in the metabolic activity of most body cells, generating ATP energy and heat.
 - d. Both raised body temperature and higher thyroxine levels in the blood inhibit the releasing hormone cells and the TSH-producing cells.

33. Apical Dominance: -

1. Apical dominance is the inhibition of lateral buds by shoot tip. OR It is the influence of terminal bud in suppressing the growth of lateral buds
2. In some plants only terminal or apical bud grows while their lateral buds do not develop as long as the terminal bud is present. Such plants are said to have apical dominance.
3. Plants with apical dominance produce auxin that inhibits lateral buds near the apical meristem from developing into actively growing shoots.
4. Removal of terminal buds releases the lateral bud from apical dominance because the source of auxin is removed and the lateral buds grow to form branches.
5. If cytokinin is applied directly on the inhibited lateral buds, they are also released from apical dominance and develop into lateral branches.

34. Differences between Kineses and Taxes: -

See Multan Board Answer No: 23

35. Functions of Hypothalamus: -

The hypothalamus through its hormone production and neural connections acts as a major coordinating centre controlling body temperature, hunger, the menstrual cycle, water balance, the sleep-wake cycle etc.

36. Neurotransmitters and their Types: -

See Gujranwala Board Answer No: 20

37. Diurnal Rhythms: -

See Exercise Chapter No: 17 Answer No: 1

38. Limbic System: -

1. Limbic system is located in an arc between the thalamus and cerebrum.
2. It works together to produce our most primitive emotions, drives, and behaviors, including fear, rage, tranquility, hunger, thirst, pleasure and sexual responses. Portion of limbic system is also important in the formation of memories.
3. It consists of:
 - a. Hypothalamus – Major coordinating center controlling body temperature, hunger, the menstrual cycle, water balance, the sleep-wake cycle etc.
 - b. Amygdala --- Produces sensation of pleasure, punishment or sexual arousal, feeling of fear and rage.
 - c. Hippocampus --- Role in long term memory hence required for learning.

39. Functions of Oxytocin Hormone: -

1. The primary action of oxytocin hormone is on smooth muscle, particularly in the uterus during child birth.
2. It also causes milk ejection from mammary glands.

40. A) Neurotransmitters: -

Neurotransmitters are chemicals which are released at the axon ending of the neurons at synapse.

B) Two Examples: -

1. Acetylcholine is the main neurotransmitter for synapses that lie outside the central nervous system.
2. Dopamine is the neurotransmitter involved in synaptic transmission within the brain and spinal cord (CNS).

41. Neuroglia and Their Functions: -

See Bahawalpur Board Answer No: 24

42. Picinian Corpuscles: -

See Multan Board Answer No: 1

BAHAWALPUR BOARD QUESTIONS

1. Explain the commercial applications of Cytokinins. (Bahawalpur Board 2008-A)
2. What are effectors? (Bahawalpur Board 2008-A)
3. Write two characters of Auxin. (Bahawalpur Board 2008-S)
4. What is synapse? (Bahawalpur Board 2008-S)
5. Write two characters of cytokinins. (Bahawalpur Board 2008-S)
6. Describe briefly about Alzheimer's Disease. (Bahawalpur Board 2009-S)
7. Differentiate between Imprinting and Habituation. (Bahawalpur Board 2009-S)
8. What are Commercial Applications of Ethene? (Bahawalpur Board 2009-S)
9. How Circadians are different from Circannual? (Bahawalpur Board 2010-A)

10. What is Dendron and how it is different from Axon? (Bahawalpur Board 2010-A)

11. Explain different types of Animal Hormones chemically. (Bahawalpur Board 2010-A)

12. Differentiate between coordination in Plants and Animals. (Bahawalpur Board 2010-S)

13. Give the role of Gastrin Hormone in Digestion. (Bahawalpur Board 2010-S)

14. Define Electrical Potential. What is it at Resting Membrane Potential? (Bahawalpur Board 2010-S)

15. Explain the commercial applications of Auxins. (Bahawalpur Board 2011-A)

16. Write down the role of Hypothalamus in chemical coordination. (Bahawalpur Board 2011-A)

17. Mention the relative abundance and distribution of receptors in human skin. (Bahawalpur Board 2011-A)

18. Define Saltatory Impulse. (Bahawalpur Board 2012-A)

19. Write down the action of Glucagon. (Bahawalpur Board 2012-A)

20. Give two characteristics of Hormones. (Bahawalpur Board 2012-A)

21. Explain Reflex Arc. (Bahawalpur Board 2013-A)

22. What are Effectors? Give one example. (Bahawalpur Board 2013-A)

23. Give application of Synthetic Auxins. (Bahawalpur Board-New Scheme-2014-A)

24. What is Neuroglia? Give its role. (Bahawalpur Board-New Scheme-2014-A)

25. Compare Sympathetic and Parasympathetic Nervous System. (Bahawalpur Board-New Scheme-2014-A)

26. Differentiate between Diurnal and Circadian Rhythms. (Bahawalpur Board-New Scheme-2015-A)

27. What are Effectors? Give example. (Bahawalpur Board-New Scheme-2015-A)

28. What are Effectors? Give example. (Bahawalpur Board-New Scheme-2015-A)

29. What are Effectors? Give example. (Bahawalpur Board-New Scheme-2015-A)

30. What are Effectors? Give example. (Bahawalpur Board-New Scheme-2015-A)

31. What are Effectors? Give example. (Bahawalpur Board-New Scheme-2015-A)

32. What are Effectors? Give example. (Bahawalpur Board-New Scheme-2015-A)

33. What are Effectors? Give example. (Bahawalpur Board-New Scheme-2015-A)

34. What are Effectors? Give example. (Bahawalpur Board-New Scheme-2015-A)

35. What are Effectors? Give example. (Bahawalpur Board-New Scheme-2015-A)

36. What are Effectors? Give example. (Bahawalpur Board-New Scheme-2015-A)

37. What are Effectors? Give example. (Bahawalpur Board-New Scheme-2015-A)

38. What are Effectors? Give example. (Bahawalpur Board-New Scheme-2015-A)

39. What are Effectors? Give example. (Bahawalpur Board-New Scheme-2015-A)

40. What are Effectors? Give example. (Bahawalpur Board-New Scheme-2015-A)

41. What are Effectors? Give example. (Bahawalpur Board-New Scheme-2015-A)

42. What are Effectors? Give example. (Bahawalpur Board-New Scheme-2015-A)

43. What are Effectors? Give example. (Bahawalpur Board-New Scheme-2015-A)

44. What are Effectors? Give example. (Bahawalpur Board-New Scheme-2015-A)

45. What are Effectors? Give example. (Bahawalpur Board-New Scheme-2015-A)

46. What are Effectors? Give example. (Bahawalpur Board-New Scheme-2015-A)

47. What are Effectors? Give example. (Bahawalpur Board-New Scheme-2015-A)

48. What are Effectors? Give example. (Bahawalpur Board-New Scheme-2015-A)

- differentiation of xylem and phloem. Or
1. Auxin produced by the young leaves near the apex inhibits the growth of lateral buds farther down.
 2. The natural stimulus to produce adventitious roots from cuttings and calluses is auxin. Or
 1. It inhibits abscission (premature fruit drop).
 2. It causes delay in leaf aging (senescence) in a few species. Or
 1. It produces apical dominance and fruit growth.
 2. It promotes cell division in stem in the region behind apex, and cell division in cambium.

4. Synapse: -

See Lahore Board Answer No: 10 (B)

5. Two Characters of Cytokinins: -

1. They inhibit root growth.
2. They promote lateral growth. Or
1. They promote bud initiation and leaf growth.
2. They promote fruit growth but can rarely induce parthenocarpy. Or
1. They promote lateral bud growth, also break bud dormancy.
2. They promote stomatal opening. Or
1. They delay leaf senescence and leaf fall. When a small area of leaf is treated with cytokinin, it remains green longer than the surrounding areas.
2. They stimulate the production of lateral buds. A high auxin/cytokinin ratio favors the production of lateral roots, and a low ratio favors the production of lateral shoots.

6. Alzheimer's Disease: -

1. Alzheimer's disease was first described by Alois Alzheimer in 1907.
2. It is a progressive degeneration of neurons of brain (especially cerebral cortex and hippocampus).
3. It is the leading cause of dementia, which may be associated with aging.
4. About 15 % of cases are linked to specific known defects that run in families and cause early onset of the disease.
5. There is also evidence that high level of aluminium may contribute to the onset of disease.

7. Differences between Imprinting and**Habituation: -**

Imprinting	Habituation
1. It is restricted to a brief sensitive period, just after hatching or birth..	1. It can occur in any period of the life of an animal.
2. It involves acquisition of new response.	2. It involves the loss of old response. If an animal is repeatedly given a stimulus which is not associated with any reward or punishment, it ceases to respond.
3. It is best known in birds such as geese, ducks, and chickens, which are all precocial birds. It is also found in mammals.	3. It is found in all animals.
4. It is irreversible.	4. It is reversible.
5. Shortly after hatching, ducklings and other young birds have tendency to	5. Rodents do not

follow moving, noisy objects in their surroundings and treat them as their mothers.	respond to alarm calls by others in their group is an example of habituation.
---	---

8. Commercial Applications of Ethene: -

See Gujranwala Board Answer No: 3

9. Circadian different from Circannual:-

Circadian	Circannual
Circadian rhythms have periods of about a day.	Circannual rhythms have periods of about a year.

10. A) Dendron:

It is single fiber of neuron which arises from the cell body of sensory neurons.

B) Dendron different from Axon: -

1. Dendron conducts nerve impulse toward cell body while axon conducts nerve impulse away from cell body.
2. Dendron arises from the cell body of only sensory neurons while axon arises from the cell body of all three types of neurons.

11. Different types of Animal Hormones Chemically:

Chemically hormones may be of following four types:

- a. Proteins (e.g. insulin and glucagon)
- b. Amino acids and derivatives (e.g. thyroxine epinephrine and norepinephrine).
- c. Polypeptides (e.g. vasopressin or ADH and oxytocin)
- d. Steroids (e.g. estrogens, testosterone, and cortisone).

12. Differences between Coordination in Plants and Animals: -

Coordination in Plants	Coordination in Animals
1. Plants exhibit chemical coordination only.	1. Animals have both chemical and nervous coordination.
2. Hormones of plants are chiefly concerned with the growth hence termed as growth regulator.	2. Hormones of the animals either stimulate or inhibit a function. They may control some long term changes such as rate of growth, rate of metabolic activities.
3. They are transported through xylem, phloem	3. They are transported through blood.
4. Their responses are slow and limited.	4. Their responses are rapid and of wide varieties.

13. Role of Gastrin Hormone in Digestion: -

When the protein food reaches the stomach, it stimulates the stomach lining to produce a hormone called gastrin. Gastrin circulates in the blood and,

when it returns to the stomach in the blood stream, it stimulates the gastric glands to continue secretion.

Or

- a. It acts in multiple ways to increase secretion of HCl and pepsinogen.
- b. It induces different functions that keep the contents moving through the tract on the arrival of a new meal.

c. It is also trophic (growth promoting) to the mucosa of the stomach and small intestine, thereby maintaining their secretory capabilities.

14. A) Electrical Potential:

The term electron potential refers to a separation of charges across the membrane or to a difference in the

relative number of cations and anions in the intracellular fluid (ICF) and extracellular fluid (ECF).

B) Electrical Potential at Resting Membrane Potential: It is -70mv at resting membrane potential.

15. Commercial Applications of Auxins: -

See Exercise Chapter No: 17 Answer No: 5

16. Role of Hypothalamus in Chemical

Coordination: -

The hypothalamus through its hormone production and neural connections acts as a major coordinating centre controlling body temperature, hunger, the menstrual cycle, water balance, the sleep-wake cycle etc.

17. Relative Abundance and Distribution of Receptors

in Human Skin: -

1. Pain receptors are nearly 27 times more abundant than cold receptors.

2. The cold receptors are nearly 10 times more abundant than heat or temperature receptors.

3. The receptors are not distributed evenly over the entire surface of body e.g. touch receptors much more numerous in the finger tips than in the skin of the back because of difference in the functions of both.

18. Saltatory Impulse: -

In a myelinated fiber, the impulse jumps from node to node skipping over the myelinated sections of the axon. This is called saltatory impulse.

19. Action of Glucagon:

1. Glucagon:

a. Actions on Carbohydrate: -

It stimulates liver cells to convert glycogen to glucose (glycogenolysis).

b. Actions on Fat: -

1. It promotes fat breakdown.

2. It inhibits triglyceride synthesis. Thus, the blood levels of fatty acids increase under glucagon's influence.

c. Actions on Protein: -

It also stimulates the production of glucose from other metabolites such as aminoacids (gluconeogenesis).

20. Two Characteristics of Hormones: -

1. Hormones are organic compounds of varying structural complexity that are poured directly and

are transported to blood to respective target tissue.

2. They do not initiate new biochemical reactions but

produce their effects by regulating enzymatic and other chemical reactions, already present. OR

1. They may either stimulate or inhibit a function.

2. Hormones may also control some long term changes,

such as rate of growth, rate of metabolic activity and sexual maturity.

21. Reflex Arc: -

See Lahore Board Answer No: 16.

22. Effectors with One Example: -

See Gujranwala Board Answer No: 11

23. Application of Synthetic Auxins: -

See Exercise Chapter No: 17 Answer No: 5

24. A) Neuroglia: -

In higher animals and in humans, neuroglia or glial cells are cells other than neurons which make up as much as half of the nervous system.

B) Role of Neuroglia: -

They play a vital role in the nutrition of neurons and their protection by myelin sheath.

25. Comparison of Sympathetic and

Parasympathetic

Nervous System:

Sympathetic System	Parasympathetic System
1. Nerves arising from the middle portion of spinal cord form the sympathetic nervous system.	1. A few cranial nerves including vagus nerve together with the nerves from the bottom portion of spinal cord, form the parasympathetic nervous system.
2. Fibers of the this system almost terminate in ganglia that lie near the cord.	2. Fibers of this system terminate in ganglia that lie near or within the organ.
3. It prepares the body for highly energetic activities such as fight or flight.	3. It promotes all the internal responses that are associated with relaxed state.
4. It accelerates the heart beat, increases the breathing rate, dilates the pupil, inhibits the digestion of food etc.	4. It slows heart beat, decreases the breathing rate, constricts the pupil, promotes the digestion of food etc.

Or

Sympathetic Nervous System	Parasympathetic Nervous System
1. It quickens the action of heart.	1. It slows the action of heart.
2. It dilates air passages.	2. It contracts air passages.
3. It contracts the blood vessels of the skin and gut so that more blood flows to the muscles where it is needed.	3. It dilates the blood vessels of the gut where the blood is needed for digestion. Blood flow to muscles is reduced.
4. It decreases gut movements.	4. It increases gut movements.
5. It decreases secretions of most glands except sweat glands.	5. It increases secretion of most glands except sweat glands.
6. It increases sweating.	6. It decreases sweating.
7. It prevents emptying of the bladder and bowels.	7. It allows emptying of

8. It dilates the pupil of the eye.	bladder and bowels.
9. It adjusts ciliary muscles so that the eyes are able to see distinct objects.	8. It constricts the pupil of the eye.
	9. It contracts ciliary muscles so that the eyes are able to see near objects.

26. Differences between Diurnal and Circadian Rhythms: -

See Bahawalpur Board Answer No: 9

27. Effectors with Example: -

See Gujranwala Board Answer No: 11

FAISALABAD BOARD QUESTIONS

- Differentiate between chlorosis and etiolation. (Faisalabad Board 2008-A)
- What is commercial application of 2,4 dichlorophenoxy acetic acid. (Faisalabad Board 2008-A)
- State two difference between nervous and chemical coordination. (Faisalabad Board 2008-A)
- Define Biorhythms. (Faisalabad Board 2009-A)
- What is Reflex Arc? (Faisalabad Board 2009-A)
- Differentiate between conditioned reflex type I and II. (Faisalabad Board 2010-A)
- Anterior lobe of the pituitary gland is master gland. Comment. (Faisalabad Board 2010-A)
- Differentiate between nerve impulse and saltatory impulse. (Faisalabad Board 2010-A)
- Discuss the active membrane potential. (Faisalabad Board 2011-A)
- Differentiate between chlorosis and etiolation (F.B- 2011). (Faisalabad Board 2011-A)
- Discuss the action of nicotine on coordination. (Faisalabad Board 2011-A)
- Define resting membrane potential. (Faisalabad Board 2012-A)
- What are neurotransmitters? (Faisalabad Board 2012-A)
- What do you know about parasympathetic nervous system? (Faisalabad Board 2012-A)
- What are practical applications of apical dominance? (Faisalabad Board 2012-A)
- Write four similarities of nervous and chemical coordination. (Faisalabad Board 2013-A)
- What is Epilepsy? (Faisalabad Board 2013-A)
- Differentiate between etiolation and chlorosis. (Faisalabad Board (Old Scheme) 2014-A)
- What is saltatory nerve impulse? (Faisalabad Board (Old Scheme) 2014-A)
- How do we experience different modalities of

- sensation? (Faisalabad Board (Old Scheme) 2014-A)
- Differentiate between nerve impulse and saltatory impulse. (Faisalabad Board (New Scheme) 2014-A)
- What are neurotransmitters? Give examples. (Faisalabad Board (New Scheme) 2014-A)
- What is chlorosis? (Faisalabad Board-New Scheme-2015-A)
- Give the commercial application of ethene. (Faisalabad Board-New Scheme-2015-A)
- Give two similarities of nervous and chemical coordination. (Faisalabad Board-New Scheme-2015-A)

Answers

1. Difference between Chlorosis and Etiolation: -

See Multan Board Answer 21

2. Commercial Application of 2,4 Dichlorophenoxy Acetic acid: -

- It inhibits sprouting of potatoes.
- It prevents premature fruit drop (abscission).
- It is used in cereal crops and lawn to eliminate broad leaved dicot weeds.

3. Two Difference between Nervous and Chemical Coordination: -

Nervous Coordination	Chemical Coordination
1. Speed of response is rapid (milliseconds)	1. Speed of response is slow (minutes to hours)
2. Duration of action is brief (milliseconds).	2. Duration of action is long (minutes to days or long).

4. Biorhythms: -

See Multan Board Answer No: 4

5. Reflex Arc: -

See Lahore Board Answer No: 16

6. Differences between Conditioned Reflex Type I and II: -

7. Anterior Lobe of the Pituitary Gland as Master Gland: -

The anterior lobe of pituitary gland is often referred to as the master gland because in addition to producing primary hormones it produces the tropical hormones which control the secretion of hormones in

many of the other endocrine glands.

8. Differences between Nerve Impulse and Saltatory

Impulse: -

See Gujranwala Board Answer No: 19

9. Action Membrane Potential: -

- Action or active membrane potential is in the form of impulse.
- During action membrane potential, inner membrane surface becomes more positive than the outside.

This

change is so brief (for perhaps a millisecond) that only a portion of the neuron is in the active membrane potential state.

10. Difference between Chlorosis and Etiolation: -

See Multan Board Answer 21

11. Action of Nicotine on Coordination: -

1. Nicotine affects postsynaptic membrane in CNS and PNS. It mimics the action of acetylcholine on nicotine

receptors, so it is stimulant of nerve impulse.

2. It increases the heart rate, blood pressure and digestive tract mobility. Nicotine may induce vomiting and diarrhea

3. It may cause water retention relation by kidneys.

12. Resting Membrane Potential: -

See Gujranwala Board Answer No: 10

13. Neurotransmitters: -

See Gujranwala Board Answer No: 20

14. Parasympathetic Nervous System: -

It is formed by some of the cranial nerves, vagus nerves and the spinal nerves arising from the sacral vertebrae.

OR

Cranial nerves III, VII, IX and X and second and third

spinal sacral nerves and occasionally the first and fourth spinal sacral nerves constitute

parasympathetic

nervous system. About 75 percent of all parasympathetic nerve fibers are in the vagus nerve (cranial nerve X) passing to entire thoracic and abdominal regions of the body.

2. This system consists of two neurons per message i.e. preganglionic and postganglionic fibers. In this system, preganglionic fiber is long, and and postganglionic fiber is short because the ganglia lie near or within the organ.

3. The neurotransmitter used by parasympathetic system

is acetylcholine (ACh).

4. It brings about the responses that are associated with a

relaxed state; for example, it causes the pupil of the eye to contract, promotes digestion of food, and

slows

the heart beat.

15. Practical Applications of Apical Dominance: -

1. It plays an important role in tap root development.
2. Application of auxins enhances apical dominance that

prevents sprouting of lateral buds (eyes) in the potatoes increasing the storing period one to three years.

16. Four Similarities of Nervous and Chemical Coordination: -

See Gujranwala Board Answer No: 7

17. Epilepsy: -

See Lahore Board Answer No: 6

18. Difference between Chlorosis and Etiolation: -

See Multan Board Answer 21

19. Saltatory Nerve Impulse: -

See Lahore Board Answer No: 10 (A)

20. Experience of Different Modalities of Sensation: -

We experience different modalities of sensation because:

1. Of differential sensitivity of receptors, that is, each type

of receptor is highly sensitive to one type of stimulus

for which it is designed. For example, receptors in the

eye are most sensitive to light, receptors in the ear to sound waves, warmth receptors in the skin to heat energy.

2. Nerve tract from each type of receptor terminates at a

specific point in the central nervous system, and type

of sensation felt is determined by the point in nervous

system to which the fiber leads. For example, Fibers from retina of the eye terminate into vision areas of the brain, fibers from the ear terminate in the

auditory areas of the brain and temperature fibers terminate

in

the temperature areas.

21. Differences between Nerve Impulse and Saltatory

Impulse: -

See Gujranwala Board Answer No: 19

22. Neurotransmitters with Examples: -

See Gujranwala Board Answer No: 20

23. Chlorosis: -

See D.G.K. Board Answer No: 5

24. Commercial Application of Ethene: -

1. It stimulates ripening of tomatoes and citrus fruit.
2. It induces flowering in pineapple.
3. A commercial compound ethephone breaks down to release ethene in plants and is applied to rubber

plants

to stimulate the flow of latex.

25. Two Similarities of Nervous and Chemical Coordination: -

1. Both help in coordination of body.
2. Both are homeostatic in function.

RAWALPINDI BOARD QUESTIONS

1. Give two characters of auxins.

(Rawalpindi Board 2010-

A)

2. Differentiate between Innate and learning behavior.

(Rawalpindi Board 2010-

A)

3. What is synapse? (Rawalpindi Board 2010-A)

4. What is the role of cytokinins in apical dominance? (Rawalpindi Board 2010-

A)

5. What is Imprinting? (Rawalpindi Board 2011-A)

6. Give two functions of cytokinin hormones.

(Rawalpindi Board 2011-

A)

7. Name hormones released by adrenal gland.

(Rawalpindi Board 2011-

A)

8. What are neurotransmitters? Give its examples.

(Rawalpindi Board 2012-

A)

9. Give three main actions of nicotine on coordination.

(Rawalpindi Board 2012-

A)

10. What is Kinesis? Give an example.
(Rawalpindi Board 2012-
A)
11. What is the effect of undersecretion of vasopressin?
(Rawalpindi Board 2013-
A)
12. How blood pressure is synergistically affected by
adrenaline and nor-adrenaline.
(Rawalpindi Board 2013-
A)
13. Define feedback mechanism.
(Rawalpindi Board-New Pattern-2014-
A)
14. Enlist any four types of learning behavior.
(Rawalpindi Board-New Pattern-2014-
A)
15. Name any two hormones of human gut.
(Rawalpindi Board-New Pattern-2014-
A)
16. What are Biological rhythms?
(Rawalpindi Board-New Pattern-2015-
A)
17. Define neurotransmitters and give examples.
(Rawalpindi Board-New Pattern-2015-
A)
18. What is mid brain's reticular formation?
(Rawalpindi Board-New Pattern-2015-
A)

Answers

1. Two Characters of Auxins: -

- In stem, auxins promote cell enlargement in region behind apex. They also promote cell division in cambium.
- Auxins are responsible for positive gravitropism of roots and negative gravitropism of stems. Or
1. Auxins stimulate cell division, cell enlargement, and bring about the increase in length of the plant.
- Auxins also initiate the development of adventitious roots when applied at the cut base of stem. Or
1. Auxins produced in young embryo promote the growth of fruit.
- Besides growth promoting function auxin also has inhibitory effect on growth. Growth of apical bud inhibits growth of lateral buds beneath the stem.

This phenomenon is known as apical dominance.

2. Differences between Innate and Learning Behavior:

See Gujranwala Board Answer No: 6

3. Synapse: -

Synapse is a junction between two neurons or between a neuron and an effector (muscle or gland). At a synapse, the membrane of the first neuron is called the presynaptic membrane, and the membrane of the next neuron is called the postsynaptic membrane. The small gap between the neurons is called the synaptic cleft.

4. Role of Cytokinins in Apical Dominance: -

- When cytokinins are applied directly on the lateral

inhibited buds, these buds are released from apical dominance and start to produce branches.

- They play an important role in tap root development.

5. Imprinting:

See Lahore Board Answer No: 3

6. Two Functions of Cytokinin Hormones: -

- It promotes fruit ripening.
- It promotes flowering in pineapple.

7. Names of Hormones released by Adrenal Gland:

-
- 1. Adrenaline (epinephrine)
- 2. Nor-adrenaline (nor-epinephrine)
- 3. Cortisol
- 4. Aldosterone
- 5. Corticosterone
- 6. Androgens

8. Neurotransmitters with Examples: -

See Gujranwala Board Answer No: 20

9. Three Main Actions of Nicotine on Coordination:

-
- 1. Nicotine is a drug that can also stimulate postganglionic neurons in the same manner as acetylcholine because the membranes of these neurons all contain nicotine type of acetylcholine receptor
- 2. It increases the heartbeat rate and blood pressure as well as digestive tract mobility. Nicotine may even occasionally induce vomiting and/or diarrhea.
- 3. It also causes water retention by the kidneys.

10. A) Kinesis:

Kinesis is a behavior in which an organism changes the speed of random movements which help them to survive in the environment. Or

- Kinesis is an orientation resulting from change in rate of activity rather than direction of movement.
- In kinesis, rate of activity is governed by the intensity of the stimulus rather than its direction.

B) Example:

- Kinesis enables pillbugs to reach the moist area which is required for their life.
- Wood-lice move about quickly in dry conditions but slow down and stop in humid areas.
- Slaters respond to low humidity by slowing the rate of movement and their rate of turning. Kinesis is a behavior in which an organism changes the speed of random movements which help them to survive in the environment.

11. Effect of Undersecretion of Vasopressin: -

Undersecretion of vasopressin (a lack of ADH) produces *diabetes insipidus* characterized by production of large quantity of dilute urine and great thirst.

Or

- Person produces a large volume of dilute urine (a condition known as *diabetes insipidus*).
- Body fluids are concentrated.

2. Thirst mechanisms are activated when excessive water is lost from the body. As long as the person drinks enough water, large decreases in body fluid water do not occur.
3. Severe dehydration can rapidly occur, If water intake is restricted.
4. Person is in danger of low blood pressure to a dangerous level.

12. Blood Pressure Synergistically Affected by Adrenaline and Nor-Adrenaline: -

1. Adrenaline dilates blood vessels in certain parts of the body such as skeletal muscles and increases the heart output.
2. Nor-adrenaline constricts blood but again only in certain areas, such as the gut.
3. So the effects of two hormones are synergistic in raising blood pressure.

13. Feedback Mechanism: -

See Multan Board Answer No: 12

14. List of Any Four Types of Learning Behavior: -

1. Imprinting
2. Habituation
3. Insight Learning
4. Latent Learning

15. Names of Any Two Hormones of Human Gut: -

1. Gastrin
2. Secretin

16. Biological Rhythms: -

See Multan Board Answer No: 4

17. Neurotransmitters with Examples: -

See Gujranwala Board Answer No: 20

8. Mid Brain's Reticular Formation: -

1. It is a relay centre connecting hind brain with the fore brain.
2. It is very important in screening the input information, before they reach higher brain centres.

SARGODHA BOARD QUESTIONS

1. Why is progesterone a constituent of birth control pills? (Sargodha Board 2010-A)
2. Give commercial applications of Cytokinins. (Sargodha Board 2010-A)

3. Differentiate between Meissner's corpuscles and Pacinians corpuscles. (Sargodha Board 2010-A)
4. Discuss latent learning. (Sargodha Board 2011-A)
5. Differentiate between Nervous Coordination and Chemical Coordination. (Sargodha Board 2011-A)
6. Sketch Nervous System of Planaria. (Sargodha Board 2011-A)

7. Define acromegaly. Give its cause. (Sargodha Board 2012-A)

8. Define neurotransmitters and give their two examples. (Sargodha Board 2012-A)

9. Define limbic system. Give its cause.

(Sargodha Board 2012-A)

10. What are neurotransmitters? Give their two examples.

(Sargodha Board 2013-A)

11. Give some commercial applications of gibberellins. (Sargodha Board 2013-A)

12. Define Resting Membrane Potential. (Sargodha Board (New Scheme) 2014-A)

13. Differentiate between chemoreceptors and mechanoreceptors. (Sargodha Board (New Scheme) 2014-A)

14. What are Commercial applications of Ethene? (Sargodha Board (New Scheme) 2014-A)

A)

Answers

1. Progesterone as Constituent of Birth Control Pills:

Progesterone suppresses ovulation. That is why it is a major constituent of birth control pill. Or Progesterone is a constituent of birth control pills because:

- a. It suppresses ovulation.
- b. It blocks the normal control of the menstrual cycle.

2. Commercial Applications of Cytokinins: -

See Gujranwala Board Answer No: 4

3. Differences between Meissner's corpuscles and Pacinians corpuscles:-

See Multan Board Answer No: 17

4. Latent Learning: -

1. Thorpe defines latent learning as the association of indifferent stimuli or situations without patent reward. Or The type of learning which is not associated with a particular stimulus and is not normally rewarded or punished, but is utilized in different situation at a later time is called latent learning.

2. The ability of rats to find their way in underground tunnels is very remarkable. If a rat is placed in a maze, it was observed that using its natural ability, the rat very soon finds its way out of the maze without being rewarded at the end of the maze.

5. Differences between Nervous Coordination and Chemical Coordination: -

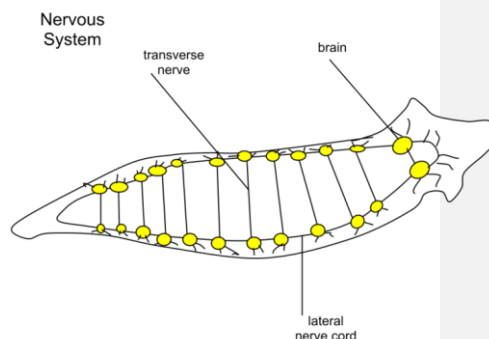
Nervous Coordination	Chemical Coordination
1. It is a wired system with structural continuity in the system. Structures include, receptors, neurons (sensory, associative and motor), and effectors (target cells). In addition, neuroglia cells are also present, which provide nutrition and protection to	1. It is a wire less system consisting of widely distributed endocrine glands (including neurosecretory cells in hypothalamus) and hormones. These are not structurally related to one another or to their target cells.

neurons.	2. Message is purely chemical (hormones).
2. Message is electrical (nerve impulse) as well as chemical (neurotransmitter).	3. Distance of action of chemical messenger (hormone) is very long. Hormones produced by endocrine glands are dispersed through out body via blood and their target cells are usually far away from where they are produced. ADH, for example, is produced from posterior lobe of pituitary gland, but affects the target cells present in the collecting tubules of nephrons of kidneys to control reabsorption of water.
3. Distance of action of chemical messengers is very short about 1mm away from where they are produced. For example, acetylcholine is released by nerve endings of one neuron at synapse and excites the next neuron.	4. Hormones are released into blood which bathe millions of cells indiscriminately and only a few respond to these hormones.
4. Neurotransmitters are released in extracellular fluid and a small group of cells (receptor cells on postsynaptic membrane) respond.	5. Response may be immediate (such as, of insulin), but usually is prolonged or delayed (such as, of growth hormone).
5. Response is immediate.	6. It shows slow but prolonged (long-lived) effects.
6. It shows rapid but brief (short-lived) effects.	7. Chemical messengers (hormones) are long-lasting (i.e. they remain active for much longer duration within blood).
7. Chemical messengers (neuro-transmitters) are short-lived (i.e. they are broken down shortly after their release).	

Or

Nervous Coordination	Chemical Coordination
1. Units of structure and functions are neurons and neuroglia.	1. Units of structure and functions are hormone.
2. Message is electro-chemical (nerve impulse, neurotransmitters).	2. Message is chemical (hormone).
3. Transmission occurs in nerves.	3. Transmission is via blood.
4. Hormones are dispersed throughout body.	4. Impulse is sent directly to target organ.
5. Response is shorter in duration.	5. Response is longer, mostly irreversible.
6. Response is faster.	6. Response is usually slower.
7. It coordinates rapid, precise responses.	7. It controls activities that require long duration rather than speed.

6. Sketch of Nervous System of Planaria:-



7. A) Acromegaly: -

It is the abnormal development of hands, feet, jaws etc. Or

1. Acromegaly means large extremities.
2. In acromegaly:
 - a. Lower jaw protrudes forward, sometimes as much as one half inch.
 - b. The forehead slants forward because of excessive development of supraorbital ridges.
 - c. The nose increases to as much as twice normal size.
 - d. The feet become very large.
 - e. The fingers become extremely thickened so that hands develop a size almost twice normal.
 - f. Changes in vertebrae occur which cause hunched back.
 - g. Many soft organs such as tongue, liver, and especially the kidneys become greatly enlarged.

B) Cause of Acromegaly: -

Acromegaly is caused by excess production of somatotrophic hormone (STH), also called growth hormone GH).

8. Neurotransmitters with Two Examples: -

See Gujranwala Board Answer No: 20

9. A) Limbic System: -

The limbic system is not a separate structure but a ring of forebrain structures that surround the brain stem and are interconnected by intricate neuron pathways.

It

includes parts of the cerebrum (parts of the frontal lobe, temporal lobe, hippocampus, and amygdala), parts of the thalamus, and hypothalamus, several nuclei in the midbrain, and the neural pathways that connect these structures.

B) Two Functions of Limbic System: -

1. It plays an important role in the formation of memories.
2. It produces our most basic and primitive emotions, derives and behavior, including fear, rage, tranquility, hunger, thirst, pleasure and sexual responses.

10. Neurotransmitters with Two Examples: -

See Multan Board Answer No: 40

11. Some Commercial Applications of Gibberellins: -

1. They are used to delay ripening and improve storage life of bananas and grape fruit.
2. G3 is used in brewing industry to stimulate α -amylase production in barley and this promotes malting.
3. They are used to break dormancy of buds and bring about the onset of flowering in many plants.
4. Gibberellins are used to induce the growth of plants and increase the size of flowers.
5. Applications of gibberellins increase the space between grapes developing large grapes. Thus they have been successfully used to produce larger seedless grapes.

12. Resting Membrane Potential: -

1. When the axon is not conducting an impulse, voltmeter records a membrane potential equal to about -70mv , indicating that inside of the neuron is more negative than the outside. This is called the resting membrane potential.
2. Na^+/K^+ pump makes a small direct contribution to resting membrane potential (about 20 %) through its unequal transport of positive ions; it transports more Na^+ ions (i.e. three) out than K^+ (i.e. two) ions in.
3. The primary role of the Na^+/K^+ pump is to actively maintain a greater concentration of Na^+ outside the cell and a greater concentration of K^+ inside the cell. These concentration gradients tend to passively move K^+ out of the cell and Na^+ into the cell. Because the resting membrane is much more permeable to K^+ than to Na^+ , hence more K^+ leaves the cell than Na^+ enters, resulting an excess of positive charge outside the cell. Thus 80 % resting membrane potential is caused by the passive diffusion of K^+ (especially) and Na^+ (to some extent) down the concentration gradient.
4. Large negative organic ions are much more inside the membrane than outside making inside more negative.
5. When the resting membrane potential of -70 mv is achieved, no further net movement of K^+ and Na^+ takes place, because any further leaking of the ions down the concentration gradients is quickly reversed by the Na^+/K^+ pump.

13. Differences between Chemoreceptors and Mechanoreceptors: -

Chemoreceptors	Mechanoreceptors
Chemoreceptors detect chemicals dissolved in fluid medium surrounding them.	Mechanoreceptors detect stimuli of touch, pressure, hearing and equilibrium.

14. Commercial Applications of Ethene: -

See Gujranwala Board Answer No: 3

DERA GHAZI KHAN BOARD QUESTIONS

1. What is saltatory impulse? (D.G.K.Board 2009-A)
2. Define imprinting and instinct. (D.G.K.Board 2009-A)
3. Name growth stimulator and inhibitor in plants.

(D.G.K.Board 2009-

A)

4. What is active membrane potential?

(D.G.K.Board 2010-

A)

5. Define Chlorosis.

(D.G.K.Board 2010-

A)

6. Write the role of Amygdala. (D.G.K.Board 2010-A)

7. Distinguish dendron from axon. (D.G.K.Board 2011-A)

8. What do you know about saltatory impulse?

(D.G.K.Board 2011-

A)

9. What is Chlorosis? How it is caused?

(D.G.K.Board 2011-

A)

10. Give commercial applications of Gibberellins.

(D.G.K.Board Group-I-2012-

A)

11. What are the functions of Oxytocin hormones?

(D.G.K.Board Group-I-2012-

A)

12. Define habituation. Give its example.

(D.G.K.Board Group-I-2012-

A)

13. What is adrenal cortex? Give its hormones as well.

(D.G.K.Board Group-II-2012-

A)

14. Define diurnal rhythms with example.

(D.G.K.Board Group-II-2012-

A)

15. Give path of nerve impulse through synapse.

(D.G.K.Board Group-II-2012-

A)

16. What is imprinting? (D.G.K.Board Group-I-2013-A)

17. Give commercial applications of Gibberellins.

(D.G.K.Board Group-I-2013-

A)

18. Differentiate between etiolation and chlorosis.

(D.G.K.Board Group-II-2013-

A)

19. What are commercial applications of Auxins?

(D.G.K.Board Group-II-2013-

A)

20. What are the commercial applications of cytokinins?

(D.G.K.Board (New Course) Group-I-2014-

A)

21. What is epilepsy?

(D.G.K.Board (New Course) Group-I-2014-

A)

22. Define Receptors. Give their types.

(D.G.K.Board (New Course) Group-I-2014-

A)

23. What are biorhythms and diurnal rhythms?

(D.G.K.Board (New Course) Group-II-2014-

A)

24. Write four important roles of Ethene.

(D.G.K.Board (New Course) Group-II-2014-

A)

25. Name hormones secreted by Islets of Langerhans

and

their role.

(D.G.K.Board (New Course) Group-II-2014-

A)

26. How instinctive behavior differs from learned behavior?
(D.G.K.Board (New Course) Group-I-2015-

A)
27. Give any two similarities between nervous and chemical coordination.
(D.G.K.Board (New Course) Group-I-2015-

A)
28. Anterior lobe of pituitary gland is called master gland.
Discuss.

(D.G.K.Board (New Course) Group-I-2015-

A)
29. Differentiate between sympathetic and parasympathetic system.
(D.G.K.Board-New Scheme-Group-II-2015-

A)
30. Define feed back mechanism.
(D.G.K.Board-New Scheme-Group-II-2015-

A)
31. Give types of innate behavior.
(D.G.K.Board-New Scheme-Group-II-2015-

A)

Answers

1. Saltatory Impulse: -

See Lahore Board Answer No: 10 (A)

2. A) Imprinting

See Lahore Board Answer No: 3

B) Instinct: -

1. Innate behavior is popularly referred to as instinct.
2. It is automatic, pre-programmed, inborn and genetically determined behavior.
3. It is not learned and inflexible, i.e. it is a stereotyped behavior not modified by experience.
4. It can equip an animal with a series of responses advantageous for animals with little or no parental care.
5. Most instincts are adaptive in nature and depend on the selection operating during the history of species.
6. It evolves gradually and natural selection modifies it to fit the environment.
7. Honey bees inherit the tendency to fly towards flowers to seek nectar and pollen.

3. Names of Growth stimulator and Inhibitor in Plants: -

1. Absciscic acid (ABA)
2. Auxin

4. Active Membrane Potential: -

It is a temporary localized reversal of the polarity of membrane of nerve cell, which occurs when membrane is stimulated. During the action potential, the polarity of nerve membrane first changes to +50

mv (i.e. depolarization) and then restores to -70 mv again

(i.e. repolarization). This action potential is extremely

rapid as it occurs only in a few milliseconds to happen. Or

1. Action potentials are rapid changes in the membrane potential that spread rapidly along the nerve fiber membrane.

2. Action potential is generated only after occurrence of stimulus of a threshold value.

3. It initiates transmission of nerve impulse.
4. It travels along an axon without a change in intensity.

5. The successive stages of action potential are as follows:

a. Resting stage: -

This is the resting membrane potential before the action potential with -70 mv. The membrane is said

to be polarized because of -70 mv negative membrane potential that is present.

b. Depolarization stage: -

At this time, the nerve membrane suddenly becomes very permeable to sodium ions which rush into the interior of the axon resulting in a positive potential

of +50mv. This is called depolarization.

c. Repolarization stage:

Within a few 10,000ths of second after the membrane

becomes highly permeable sodium channels begin to close and the potassium channels open more than normal. Now potassium ions move from inside the axon to outside the axon due to which action

potential swings down from +50 to -70 mv. This is called repolarization of membrane.

5. Chlorosis: -

1. It is a condition in which plants take on a yellowish hue when they fail to form sufficient chlorophyll.
2. It occurs if certain minerals, especially magnesium and iron, are lacking in the soil.
3. Chlorosis also occurs when insufficient light is available during germination.

6. Role of Amygdala: -

It produces sensation of pleasure, punishment, or sexual arousal when stimulated. It is also involved

in the feelings of fear and rage. Or

1. Effects of Amygdala mediated through

Hypothalamus:

- a. Increase or decrease in arterial pressure
- b. Increase or decrease in heart rate
- c. Increase or decrease in gastrointestinal mobility and secretion
- d. Secretion of various anterior pituitary hormones

2. Direct Effects of Amygdala: -

- a. Reactions of reward and pleasure
- b. A pattern of rage, escape, punishment, severe pain and fear similar to rage pattern elicited from the hypothalamus
- c. Sexual activities that include erection, copulatory movements, ejaculation, ovulation, uterine activity, and premature labor.

7. Dendron different from Axon: -

See Lahore Board Answer No: 9

8. Saltatory Impulse: -

See Lahore Board Answer No: 10 (A)

9. A) Chlorosis: -

It is yellow appearance of leaves due to lack of chlorophyll.
Or
It is a condition in which plants take on a yellowish hue when they fail to form sufficient chlorophyll.

B) Cause of Chlorosis: -

1. It occurs if certain minerals, especially magnesium and iron, are lacking in the soil.
2. Chlorosis also occurs when insufficient light is available during germination.

10. Commercial Applications of Gibberellins: -

See Sargodha Board Answer No: 11

11. Functions of Oxytocin Hormones: -

See Multan Board Answer No: 39

12. Habituation with Example: -

1. It is the type of learned behavior in which animal stops responding to a repeated stimuli, which are neither beneficial nor harmful.
2. It is the simplest form of learning.
3. Habituation does not involve acquisition of new responses but the loss of old ones.
4. The loss of response can be useful in preventing a drain of energy.
5. A snail crawling on a sheet of glass retracts into shell

when glass is tapped. After a pause, it emerges and continues moving. A second tap causes retraction again but it emerges more quickly. Ultimately,

tapping

has no effect and snail ceases to respond.

13. A) Adrenal cortex: -

1. The outer layer of adrenal gland is called adrenal cortex.
2. It works under the influence of ACTH of the anterior pituitary gland.
3. It is active all the times but especially so following shock or stress situations and infections.

B) Hormones of Adrenal Cortex: -

It produces a number of steroid hormones collectively

termed as corticosteroid hormones. On the basis of their primary actions, these can be divided into three categories:

- A. Mineralocorticoids ---- Aldosterone- Conserves the level of Na⁺ ions in the body by preventing their loss through kidney tubules
- B. Glucocorticoids ----- Cortisol-- Brings about an increase in blood glucose level mainly by its production from protein and antagonizing the action of insulin.
- C. Mineralo- as well as Gluco-corticoids--- Corticosterone---Increases blood glucose levels and regulates mineral ion balance.
- D. Sex hormones ----- Androgens---Cause development of the secondary male characteristics.

14. Diurnal Rhythms with Example: -

See Exercise Chapter No: 17 Answer No: 1

15. Path of Nerve Impulse through Synapse: -

1. When an impulse reaches a synaptic knob, synaptic vesicles within fuse with synaptic membrane, causing the release of neurotransmitter molecules into the synaptic cleft.

2. The neurotransmitter molecules bind to the receptors

on postsynaptic membrane.

3. The neurotransmitter molecules trigger an action potential in the postsynaptic neuron, by causing changes in its permeability to certain ions.

16. Imprinting: -

1. The term imprinting was coined by Konard Lorenz in

1930, while studying ducklings. He found that ducklings and other precocial birds (those that can walk at hatching and do not stay in the nest) follow

the

first large, noisy object that see after hatching.

Thereafter, they will continue to follow the same object even if their true mother is there.

2. Imprinting is restricted to a brief sensitive period, just

after hatching.

17. Commercial Applications of Gibberellins: -

See Sargodha Board Answer No: 11

18. Differences between Etiolation and Chlorosis: -

See Multan Board Answer No: 21

19. Commercial Applications of Auxins: -

See Exercise Chapter No: 17 Answer No: 5

20. Commercial Applications of Cytokinins: -

See Gujranwala Board Answer No: 4

21. Epilepsy: -

See Lahore Board Answer No: 6

22. A) Receptors: -

Receptor is a cell, or neuron ending or a receptor organ that detects changes in the external and internal environment of the animal.

B) Types:

1. Mechanoreceptors: -

Mechanoreceptors detect stimuli of touch, pressure, hearing and equilibrium.

2. Photoreceptors: -

They respond to stimuli of light for example in eyes, rods and cones.

3. Chemoreceptors: -

They are for smell, taste, and for blood oxygen, carbon dioxide, glucose, amino acids and fatty acids. They are found in tongue, nose and in the hypothalamus.

4. Thermoreceptors: -

These show response to cold and warmth.

5. Nociceptors: -

They produce the sensation of pain.

23. A) Biorhythms: -

1. Biorhythms or biological rhythms are behavioral activities that occur at regular intervals.
2. Biorhythms are in organisms' genes but the environment influences these rhythms to some extent.
3. Many organisms maintain internal rhythm or clock to predict the onset of the periodic changes and keep them prepared for these changes.
4. The basic period of clock is innate.
5. Some rhythms are exogenous or driven solely by external events.
6. Most rhythms are endogenous meaning they are of

internal origin.
 7. Many of these rhythms are driven by an internal clock (endogenous) whose setting may be modified by external changes (exogenous).

B) Diurnal Rhythms: -

Organisms exhibit periodic fluctuations that correspond to environmental changes. When these rhythms occur with a frequency of about 24 hours they are called circadian rhythms. They continue to run in the absence of external environmental factors.

24. Four Important Roles of Ethene: -

1. It inhibits the elongation of stems and roots (stem and root growth).
2. It promotes fruit ripening.
3. It accelerates leaf fall.
4. It promotes flowering in pineapple. Or
1. It promotes cell division in wounded tissue, forming a mass of cells called a callus.
2. It breaks dormancy of buds and seeds in some species.
3. It also initiates flowering in some plants e.g. pineapple.
4. It triggers ripening of the fruit.

25. Names of Hormones secreted by Islets of Langerhans and their Role: -

See Lahore Board Answer No: 21

26. Instinctive Behavior Different from Learned Behavior: -

See Gujranwala Board Answer No: 6

27. Any Two Similarities between Nervous and Chemical Coordination: -

1. Both help in coordination of body.
2. Both are homeostatic in function.

28. Anterior Lobe of Pituitary Gland As Master Gland: -

Anterior lobe of pituitary gland is called master gland because in addition to producing primary hormones it produces the tropic hormones which control the secretion of hormones of many of the other endocrine glands.

29. Differences Between Sympathetic and Parasympathetic System: -

Sympathetic System	Parasympathetic System
1. Nerves arising from the middle portion of spinal cord form the sympathetic nervous system.	1. A few cranial nerves including vagus nerve together with the nerves from the bottom portion of spinal cord, form the parasympathetic nervous system.
2. Fibers of the this system almost terminate in ganglia that lie near the cord.	2. Fibers of this system terminate in ganglia that lie away from the cord.
3. It prepares the body for highly energetic activities such as fight or flight.	3. It promotes all the internal responses that are associated with relaxed

4. It accelerates the heart beat, increases the breathing rate, dilates the pupil, inhibits the digestion of food etc.	state. 4. It slows heart beat, decreases the breathing rate, constricts the pupil, promotes the digestion of food etc.
--	---

30. Feed Back Mechanism: -

1. It is a type of mechanism in which controlling mechanism is itself controlled by the products of reactions it is controlling. Or
Detection of change and signaling for the effector's response to control system is a feed back mechanism.
2. An example of feedback system is as follows:
 - a. Low body temperature or stress stimulates neurosecretory cells of the hypothalamus to release TRF which acts on anterior pituitary to release TSH.
 - b. TSH stimulates the thyroid gland to secrete thyroxine.
 - c. Thyroxine causes an increase the the metabolic activity of most body cells, generating ATP energy and heat.
 - d. Both raised body temperature and higher thyroxine levels in the blood inhibit the releasing hormone cells and the TSH-producing cells.

31. Types of Innate Behavior: -

i. Orientation: -

Kineses: -
 It is an orientation behavior in which animal changes the speed of the random movements which help them to survive in the environment.

For example, kinesis enables pillbugs to reach the moist area which is required for their life.

ii. Taxes: -

It is another orientation behavior, which is related to the direction of stimulus. The movement towards the stimulus is called positive taxis while away from the stimulus is negative taxis.

For example, a moth flies towards the light is positive photo-taxis.

2. Reflexes and Instincts: -

These extremely complex behaviors and include biological rhythms, territorial behavior, courtship, mating, aggression, altruism, social hierarchies and social organizations.

SAHIWAL BOARD QUESTIONS

1. Write down the commercial applications of auxins.
(Sahiwal Board 2013-14)
2. What are effectors? Give examples.
(Sahiwal Board 2013-14)
3. What are Neuroglia? Give their functions.
(Sahiwal Board (New Scheme) 2014-15)
4. What are neurotransmitters? Quote examples.
(Sahiwal Board (New Scheme) 2014-15)
5. Differentiate between gastrin and secretin hormones.

(Sahiwal Board (New Scheme) 2014-

A)
6. What is Secretin?

(Sahiwal Board-New Scheme-2015-

A)
7. What are Nissl's granules?

(Sahiwal Board-New Scheme-2015-

A)
8. What do you know about somatotrophin hormone (STH)? (Sahiwal Board-New Scheme-2015-

A)

Answers**1. Commercial Applications of Auxins: -**

See Exercise Chapter No: 17 Answer No: 5

2. Effectors with Examples: -

See Multan Board Answer No: 11

3. Neuroglia and their Functions: -

See Multan Board Answer No: 15

4. Neurotransmitters with Examples: -

1. Neurotransmitter is the chemical messenger that is released from axon terminal of a neuron in response to an action potential and influences another neuron or an effector with which the neuron is anatomically linked.

2. More than 60 different chemicals are known or suspected to functions as neurotransmitter.

3. These are present in the CNS and PNS.

4. These chemical messengers are primarily amino acids

or closely related compounds.

5. Classical neurotransmitters are small molecules which

are synthesized and packaged in the synaptic vesicles

of presynaptic neuron.

6. They are released by exocytosis into the synaptic cleft.

7. They bind to receptor sites on the postsynaptic neuron

and act on subsynaptic membrane of postsynaptic cell.

8. When neurotransmitter molecules bind to receptors, they directly or indirectly cause ion channels to open or close, thus changing the permeability of the postsynaptic membrane to certain ions.

9. Neurotransmitters are quickly removed from synaptic cleft.

10. Acetylcholine (ACh), norepinephrine (NE), dopamine,

and serotonin are examples of neurotransmitters.

5. Differences between Gastrin and Secretin Hormones: -

Gastrin	Secretin
1. It is produced by mucosa of pyloric region of the stomach.	1. It is produced by the duodenum.
2. It is produced when partly digested protein particles touch the lining of stomach.	2. It is produced when acidic food touches the lining of duodenum.
	3. It affects the pancreas to produce and

3. It stimulates the secretion of gastric juice.	release pancreatic juice as well as rate of bile production in the liver.
--	---

6. Secretin: -

1. It is produced by the duodenum.

2. It is produced when acidic food touches the lining of duodenum.

3. It affects the pancreas to produce and release pancreatic juice.

4. It also affects the rate of bile production in the liver.

7. Nissl's Granules: -

1. Nissl's granules are groups of ribosomes associated with RER and Golgi apparatus.

2. They are present in the cell body.

8. Somatotrophin Hormone (STH): -

1. Somatotrophin hormone (STH) or Growth hormone (GH) is secreted by the anterior lobe of pituitary.

2. Its secretion is controlled by a releasing factor known

as Somatotrophin releasing factor (SRF) that is secreted from hypothalamus.. SRF is secreted throughout life.

3. STH regulates the growth of the body. When growth has mostly ceased after adolescence, the hormone continues to promote protein synthesis throughout the

body.

4. In children, a deficiency of this hormone leads to dwarfism as well as other symptoms associated with lack of thyroid and adrenal hormones and an over secretion leads to gigantism.

5. In adults, excess somatotrophin hormone causes acromegaly which is characterized by abnormal development of hands, feet, jaws etc.

C h a p t e r ---- 18**REPRODUCTION**

3 SQs

1) From Exercise:-**Questions**

1. What changes occur in ovulation and menstruation during pregnancy?

2. What is the difference between oogenesis and spermatogenesis?

3. How is seed formed?

4. What is the importance of seed in the life cycle of a plant?

Answers**1. Changes taking place in Ovulation and****Menstruation during Pregnancy: -**

Ovulation and menstruation stop during pregnancy due to hormonal changes.

2. Differences between Oogenesis and**Spermatogenesis:**

Oogenesis	Spermatogenesis
1. It is the production of female gametes (ova) by the meiosis and maturation.	1. It is the production of male gametes (sperms) by meiosis and maturation.
	2. It occurs in the testes of

2. It occurs in the ovaries of females.	males.
3. It produces one egg or ovum per meiosis.	3. It produces four sperms or spermatozoa per meiosis.
5. It does not always go to completion.	5. It always goes to completion.

3. Formation of Seed:

After fertilization, the developing seeds are not only rich source of auxins and gibberellins, but also of cytokinins. These growth substances are mainly associated with development of the embryo and accumulation of food reserves in the seed. Or After fertilization the seed is formed as a result of changes taking place in the ovule with rich source of auxin, gibberellins and cytokinins:

- Diploid zygote develops into embryo consisting of hypocotyle (with radicle), epicotyle (with plumule) and cotyledons.
 - The triploid endosperm nucleus divide mitotically to form endosperm tissue. In most flowering plants endosperm provides nutrients for the embryo while in many others, it disappears completely by the time the seed is mature.
 - Integuments harden and become the seed coat of a seed.
 - Haploid cells remaining in the embryo sac (antipodals, synergids, tube nucleus) degenerate.
- 4. Importance of Seed in the Life Cycle of a Plant: -**
- In seed, embryo is protected from drought and other unfavorable environmental conditions.
 - Seed can easily be dispersed.
 - Seed introduces the dormant phase in the life cycle of a plant that allows the embryo to survive until environmental conditions are favorable for further growth.

II) From Punjab Boards:-**LAHORE BOARD QUESTIONS**

- What is the role of placenta in man?
(Lahore Board 2008-A)
- Differentiate between oviparous and viviparous animals.
(Lahore Board 2008-A)
- What are test tube babies?
(Lahore Board 2009-A)
- What is ovoviviparous condition?
(Lahore Board 2009-A)
- What is meant by cloning?
(Lahore Board-2010-A)
- How identical twins differ from fraternal twins?
(Lahore Board-2010-A)
- What is parthenocarpy?
(Lahore Board-2010-A)
- How lactation differ from gestation?
(Lahore Board-2010-A)
- Define parthenocarpy. How it is artificially induced?

(Lahore Board-2011-

- What is climacteric and also give its role?
(Lahore Board-2011-A)

- Give importance of photoperiodism in plants.
(Lahore Board-2011-A)

- How oestrous cycle is different from menstrual cycle?
(Lahore Board-Group-I-2012-A)

- Define vernalisation. (Lahore Board-Group-I-2012-A)
- What are ovoviviparous? Give an Example.
(Lahore Board-Group-I-2012-A)

- Explain menopause and after birth.
(Lahore Board-Group-II-2012-A)

- What is diplohaplontic life cycle in plants?
(Lahore Board-Group-II-2012-A)

- Define diploid parthenogenesis.
(Lahore Board-Group-I-2012-A)

- Name the types of plants according to photoperiodism.
(Lahore Board-Group-I-2013-A)

- Differentiate between identical twins and fraternal twins.
(Lahore Board-Group-I-2013-A)

- Write down at least two important measures to prevent AIDS.
(Lahore Board-Group-I-2013-A)

- What is parthenocarpy? Give an example?
(Lahore Board-Group-II-2013-A)

- Give the differences between oviparous and viviparous animals.
(Lahore Board-Group-II-2013-A)

- What is structure and function of corpus luteum?
(Lahore Board-Group-II-2013-A)

- Explain estrous cycle.
(Lahore Board (Session-2012-14) Group-I-2014-A)

- What is meant by lactation? How it is controlled?
(Lahore Board (Session-2012-14) Group-I-2014-A)

- How identical twins and fraternal twins are produced?
(Lahore Board (Session-2012-14) Group-I-2014-A)

- What is Apomixis?
(Lahore Board (Session-2012-14) Group-II-2014-A)

- What are test tube baby?
(Lahore Board (Session-2012-14) Group-II-2014-A)

- What is seed dormancy? Give its importance.
(Lahore Board (Session-2012-14) Group-II-2014-A)

-

Answers

- Role of Placenta in Man: -**

1. Placenta provides nutrients and oxygen for fetus from the mother blood.
2. Placenta removes wastes and carbon dioxide from the fetus to maternal blood which the mother excretes.
3. It also produces hormones that regulate pregnancy.

Or

1. Diffusion of oxygen through the placental membrane
2. Diffusion of carbon dioxide through the placental membrane
3. Diffusion of food stuff through the placental membrane
4. Excretion of waste products through the placental membrane
5. Secretion of following hormones in order to maintain pregnancy:
 - a. Human chorionogonadotropin (hCG)--Maintains corpus luteum of pregnancy
 - b. Estrogen--- Stimulates growth of the myometrium, increasing uterine strength for parturition (birth) and helps the mammary gland for lactation
 - c. Prolactin--- Along with LTH (secreted by pituitary) stimulates mammary development in preparation for lactation.

2. Differences between Oviparous and Viviparous Animals: -

Oviparous	Viviparous
1. The animals which leave the body of mother as eggs are called oviparous.	1. The animals which leave body of the mother (in sea horses, the father) at an advanced stage of development and give birth to young are called viviparous animals.
2. Their eggs may or may not be surrounded by shell.	2. Eggs are without shell.
3. Fertilization is external in some and internal in others.	3. Fertilization is internal in all.
4. Development of their young take place outside the mother body in the laid eggs.	4. Their young develop inside the parent.
5. During development, young obtain nourishment from the egg yolk.	5. Their young obtain nourishment directly from the mother's body rather than from egg yolk

3. Test Tube Babies: -

1. Test tube baby is a technique, also called in vitro fertilization, in which parental sperm and ovum is fertilized in vitro- outside the female body and then the zygote is implanted back into the mother uterus, placenta establishes and remaining development takes place in the body of the mother leading to normal birth.
2. Parents which are unable to enjoy the normal process of fertilization and birth of their offspring due to some physiological and physical abnormalities in any two parents are being benefited with this method.

4. Ovoviviparous Condition: -

In some mammals like duck bill platypus, internal fertilization leads to internal development of young one in a shelled egg and when development is completed, shelled egg is laid which hatches to offspring. This is called Ovoviviparous condition.

5. Cloning: -

1. Cloning is the production of duplicate copies of genetic material (DNA), cells, entire multicellular organism, all derived from a common ancestor.
2. A population of genetically identical individuals produced from a single parent is called a clone.
3. In animals and especially among vertebrates, a nucleus from the somatic cell is removed and introduced into an egg cell, whose nucleus has been destroyed by ultra violet radiation. The egg with transplanted diploid somatic cell nucleus develops into an organism, genetically identical to the parent who has contributed the nucleus.
4. The cloning of desirable animals such as prize bulls, race horses etc. might as useful as cloning of useful varieties of plants.

6. Identical Twins different from Fraternal Twins: -

Identical Twins	Fraternal Twins
1. They are developed from one zygote, involving fertilization of single egg by a single sperm as normal.	1. They are developed from two zygotes, involving fertilization of two different eggs.
2. They have the same genotype, because the cells of two-cell embryo separate, and each cell develops into a complete organism.	2. As each egg is fertilized by a separate sperm hence the genotype of each zygote is different from the other.
3. They must be of same sex.	3. They need not be of the same sex.
4. Sometimes, they may share a placenta and amnion.	4. Each member of fraternal twin has its own placenta and amnion.
5. They are the product of asexual reproduction (mitosis).	4. They are the product of sexual reproduction.

7. Parthenocarpy: -

1. In some cases fruit development proceeds without fertilization and thus no seed formation takes place e.g. banana, pineapple and some varieties of oranges and grapes. Such development is called parthenocarpy.
 2. Parthenocarpy is due to hormonal imbalance, usually high auxin levels occur in these ovaries.
 3. It is sometime artificially induced for commercial purposes, by adding auxins as in tomatoes, peppers etc.
- Or
1. The process in which fruit formation takes place without pollination and fertilization is called parthenocarpy
 2. Fruits formed as a result of parthenocarpy are called parthenocarpic fruits.
 3. Parthenocarpic fruits are always seedless.

4. Parthenocarpic fruits are quite regularly produced in such cultivated plants as the banana, pine-apple, some grape and orange varieties.
5. In parthenocarpic plants developing embryo produces auxins that stimulate the ovary to develop into the fruit.
6. Parthenocarpy can be induced by treating unpollinated flowers with IAA, or a closely related synthesized chemical.

8. Lactation different from Gestation:

Lactation	Gestation
1. It is the period of production and release of milk from mammary glands for the nourishment of new born baby.	1. It is period starting from conception upto the birth of a baby.
2. Its period in human female is about two years and depends upon the nursing of the baby. The more the infant nurses, the more milk is produced for the next feeding.	2. The total gestation period in human female is usually about 280 days (nine months).

9. A) Parthenocarpy:

The phenomenon, in which fruit formation occurs in the absence of fertilization, is called parthenocarpy.

Or

Development of fruit without pollination and fertilization is called Parthenocarpy. Or Fruit setting in the absence of pollination is called Parthenocarpy.

B) How Artificially Induced: -

Parthenocarpy can artificially be induced by treating unpollinated flowers with IAA, or a closely related synthesized chemical.

10. A) Climacteric: -

It is a burst of respiratory activity which is associated

with ethene production and fruit ripening. Or

1. It is a period of increased respiration.
2. During climacteric, ripening fruits undergo an integrated set of changes, including a decline in organic acid, an increase in sugar content, softening and often a color change.
3. During climacteric there is also a dramatic increase in

ethene production.

B) Role of Climacteric: -

It helps in ripening of fruit.

11. Importance of Photoperiodism in Plants: -

Photoperiodism allows plants to reproduce synchronously and in the appropriate season. It is important for following seasonal changes in the growth:

- a. Production of flower
- b. Formation of bulbs and tubers
- c. Autumn leaf-fall in deciduous trees
- d. Formation of winter buds during late summer in deciduous trees
- e. Formation of runners in strawberry plants

12. Oestrous Cycle different from Menstrual Cycle: -

Oestrous Cycle	Menstrual Cycle
1. It is found in the females of all mammals except primates (monkeys, apes and humans).	1. It is found in the females of primates.
2. Oestrous cycle may occur only once a year in some mammals and in others twice a year and in some more often.	2. In human female it occurs after 28 days.
3. All mammals with estrous cycle show degeneration of uterine wall between successive ovulation as primates, but changes are usually not so drastic that blood is lost.	3. In menstrual cycle, ovulation occurs and if ovum is not fertilized and implanted in the uterus, uterine wall is broken down with the discharge of blood, mucous and cellular debris through vagina.
4. Mammals with estrous or heat period have mating desire only during that time.	4. Mammals with menstrual cycle have the unusual habit of mating desire and breeding throughout the whole year.

13. Vernalisation: -

1. Biennial and perennial plants are stimulated to flower by exposure to low temperature. This is called vernalization.
2. The low temperature is stimulated by the shoot apex of a mature stem or embryo of seed but not by the leaves as in photoperiodism.
3. For some plants vernalisation is an absolute requirement.
4. In some plants, vernalization simply assists in inducing flower.
5. Temperature around 4 °C is found to be very effective.
6. Vernalization stimulates the production of "Vernalin" hormone which induces vernalization. It is now believed that vernalin is nothing special but actually is gibberellin.
7. It ensures reproduction at favorable times of year.
8. It also ensures that members of the same species flower at the same time, encouraging cross pollination for genetic variability.

4. Ovoviviparous with an Example: -

1. Ovoviviparous is a type of development in which:
 - a. Fertilization is internal
 - b. Fertilized eggs are retained within the mother's body.
 - c. Eggs are incubated within the mother's body.
 - d. Development of young occurs in the eggs.
 - e. During development, young depend on stored yolk for their nourishment rather than on transfer of materials from the mother.
 - f. Youngs are fully developed when they are hatched and released from the mother.
2. Examples include:
 - a. Many species of shark are ovoviviparous.

- b. Some mammals like duckbill platypus and spiny ant-eater are ovoviviparous.
- c. All native geckos and all but one species of native skinks are ovoviviparous.
- d. *Daphnia* is an ovoviviparous animal living in ponds.

15. A) Menopause: -

The end or complete stop of the menstrual cycle is called menopause, after which the female stops producing the ova. Or
The period during which ovulation fails to occur, menstruation stops and female sex hormones cease

to produce is called Menopause. Or
Between the age of 40-50, the ovaries of female cease

to release ova or produce hormones. As a consequence, menstrual periods cease, the woman can

no longer have children and sexual desire is gradually

reduced. This is called Menopause.

B) After Birth: -

Within 10-45 minutes after birth, the uterus contracts and separates the placenta from the wall of the uterus and placenta then passes out through vagina. This is called After birth. Bleeding, throughout this period, is

controlled by the contraction of smooth muscle fibers

which completely surround all blood vessels supplying the placenta. Average loss of blood is about

350 cm³. Or

The detaching of the placenta from the uterine wall and its expulsion a short time after the birth of the baby is called After Birth. Or

During the succeeding 10 to 45 minutes after birth of the baby, uterus continues to contract to a smaller and

smaller size, which causes a shearing effect between the walls of the uterus and the placenta, thus separating placenta from its implantation site which

is passed out through vagina. This is called After Birth.

Separation of the placenta opens the placental sinuses

and causes bleeding.

16. Diplohaplontic Life Cycle in Plants: -

Diplohaplontic life cycle in plants is the life cycle in which diploid sporophyte and haploid gametophyte generations alternate with each other.

17. Diploid Parthenogenesis: -

1. It is a type of parthenogenesis in which the egg producing cells of the female undergo a modified form of meiosis involving total non disjunction of chromosomes,

they retain the diploid number of chromosomes. Egg (diploid) develops into young female.

2. It is found in aphids.

18. Names of the Types of Plants according to Photoperiodism: -

1. Short Day Plants (SDP), e.g. Strawberry
2. Long Day Plants (LDP), e.g. Cabbage
3. Day Neutral Plants (DNP), e.g. Cotton

19. Identical Twins different from Fraternal Twins: -
See Lahore Board Answer No: 6

20. Two Important Measures Preventing AIDS: -

1. It can be prevented by avoiding sexual contact with carrier or diseased person.
2. It can be prevented by adopting the hygienic conditions. Or

1. Avoid sharing of blood-contaminated needles or syringes. Always use new sterilized needles.
2. Avoid high risk sexual activities such as sex with many partners, anal intercourse etc.

21. Parthenocarp with Example: -

See Lahore Board Answer No: 7

22. Differences between Oviparous and Viviparous Animals: -

See Lahore Board Answer No: 2

23. A) Structure of Corpus Luteum: -

It is a yellow glandular body formed from ruptured follicles after release of egg. Or

1. Corpus luteum means (corpus means "body", luteum means "yellow") yellow structure.
2. It is an ovarian structure that develops from a ruptured follicle after ovulation.
3. It has abundant storage of cholesterol, giving it a yellow appearance.
4. It becomes highly vascularized.
5. Fully developed corpus luteum is about 1.5 centimeters in diameter.
6. LH promotes the development of corpus luteum.
7. About 12 days after ovulation, corpus luteum loses its

secretory function, yellowish lipid characteristic and degenerates.

B) Function of Corpus Luteum: -

Corpus luteum secretes progesterone which develops

the endometrium and make it receptive for the implantation of zygote (placenta formation). Or
The function of corpus luteum is to secrete into the blood abundant quantities of progesterone along

with smaller amounts of estrogen. OR
It secretes estrogen and progesterone.

24. Oestrous Cycle: -

1. It is a reproductive cycle found in all females except humans.
2. In this cycle:
 - a. The estrogen prepares the uterus for conception.
 - b. Follicle develops ova.
 - c. Female needs a physical stimulus of mating for ovulation and exhibits the desire for mating. Female is said to be on heat.

25. A) Lactation: -

Production and release of milk from the breast is called lactation. Or

Lactation is the production of milk by the cells of the

alveoli of breast is called Lactation. Or

It is the milk production by mammary Glands for nourishing young.

B) Control of Lactation: -

It is controlled by following hormones:

1. Estrogen
2. Progesterone
3. Prolactin
4. Leutotrophic hormone (LTH)
5. Placental lactogen

26. A) Production of Identical Twins: -

After fertilization, zygote undergoes cleavage (cell division by mitosis). When embryo is at two cell stage, the two blastomeres, instead of remaining together,

may separate and behave as two independent zygotes, giving

rise to two genetically identical twins. Or

An egg is fertilized as normal with a single sperm and the resulting zygote divides into two cells by cleavage. However these cells do not remain

together, they separate and continue independent development

forming identical twins with same sex.

B) Production of Fraternal Twins: -

In some cases, two eggs are produced by the female and both these eggs are independently fertilized forming two zygotes. These zygotes develop into

two genetical different fraternal twins. Or

Sometimes a woman releases two ova when she ovulates. If both ova are fertilized, they may form

twin embryos, each with its own placenta and amnion.

Twins formed in this way are called fraternal twins.

27. Apomixis: -

1. It is a form of parthenogenesis.
2. In apomixis, diploid cell of the ovule (either from the nucellus or megaspore) develops into a functional embryo in the absence of a male gamete.
3. The rest of the ovule develops into the seed.
4. The ovary develops into fruit. Or
1. It is the production of seeds without flowers being fertilized hence it is the asexual production of seeds.
2. In apomixis, ovule matures into seed, ovary into fruit but the embryo in seed develops from a diploid cell in the ovule rather than from a diploid zygote (formed from the union of haploid gametes).
3. Although seeds are produced asexually, they gain the advantage of their dispersal, an adaptation usually associated with sexual reproduction.
3. Apomixis is found in potatoes, certain grasses (such as

Kentucky blue grass), dandelions, citrus trees, mango, blackberries and garlic.

28. Test Tube Baby: -

1. Test tube babies is the method of fertilization of eggs in a test tube.
2. In this method:
 - a. The woman is given fertility drugs which cause her ovaries to release several mature ova simultaneously.
 - b. Some of the oocytes are sucked from the ovary of the women before ovulation.
 - c. These eggs are fertilized outside her body in a laboratory dish, with the sperm taken from her husband.
 - c. Eggs thus fertilized in vitro are allowed to develop for a few days in the laboratory.
 - c. Embryos (dividing zygotes) are screened for chromosome or gene abnormalities..
 - d. One or more of the dividing zygotes are then introduced into woman's uterus by means of a tube inserted through the cervix.
 - e. Usually, only one (or none) of the zygote develops though, occasionally, there are multiple birth. The success rate of test tube babies is about 31 %.

29. A) Seed Dormancy: -

1. Seed dormancy is a special condition of rest in which the embryo ceases or limits its growth. Or Seed dormancy is a length of time in which embryo of seed has very low metabolic rate and is not growing and developing.
2. Environmental signals both initiate and end seed dormancy. Temperature, water, and light are examples of such signals
3. Seeds can remain dormant for hundreds of year.
4. Favorable temperature, day length, and amounts of water can release seeds from a dormant state.

B) Importance of Seed Dormancy: -

Seed dormancy enables an embryo to survive the long periods of unfavorable environmental conditions, such as water scarcity or low temperature. This is of great survival importance to the plant in that it prevents the dormant seed from germinating in response to conditions such as warm spell in winter, which, although apparently favorable, are only temporary. Or Seed dormancy is important for plants because it ensures their survival in unfavorable conditions and allowing them to germinate when the chances of survival for the young plants are the greatest.

GUJRANWALA BOARD QUESTIONS

1. Explain the disease genital herpes. (Gjranwala Board 2008-A)
2. What are identical twins? (Gjranwala Board 2008-A)

3. What is tissue culturing? (Gjranwala Board 2008-A)
4. Differentiate between oviparous and viviparous. (Gjranwala Board 2009-A)
5. Explain apomixis. (Gjranwala Board 2009-A)
6. Explain the disease gonorrhea. (Gjranwala Board 2009-A)
7. What are spermatophytes? (Gjranwala Board 2010-A)
8. How implantation differs from gestation? (Gjranwala Board 2010-A)
9. Differentiate placenta from after birth. (Gjranwala Board 2010-A)
10. Define photoperiodism. (Gjranwala Board 2011-A)
11. What is diploid parthenogenesis? (Gjranwala Board 2011-A)
12. Give the role of oxytocin. (Gjranwala Board 2011-A)
13. What are phytochromes? (Gjranwala Board 2012-A)
14. What is the difference between oogenesis and spermatogenesis in humans? (Gjranwala Board 2012-A)
15. What is genital herpes? (Gjranwala Board 2013-A)
16. Differentiate between short day plants and long day plants. (Gjranwala Board 2013-A)
17. What is corpus luteum? Give its function. (Gjranwala Board 2013-A)
18. What is Apomixis? (Gjranwala Board (New Scheme) (2014-A)
19. Compare Oviparous with Viviparous. (Gjranwala Board (New Scheme) (2014-A)
20. Differentiate between identical and fraternal twins. (Gjranwala Board (New Scheme) (2014-A)
21. What is tissue culture? Explain. (Gjranwala Board (New Scheme) (2014-A)
22. What is menopause? At what age it starts? (Gjranwala Board (New Scheme) (2014-A)
23. Write a note on test tube babies. (Gjranwala Board (New Scheme) (2014-A)
24. Differentiate between tissue culture and cloning. (Gjranwala Board-New Scheme-2015-A)
25. What is seed dormancy? (Gjranwala Board-New Scheme-2015-A)
26. What is syphilis? (Gjranwala Board-New Scheme-2015-A)

Answers

1. Genital Herpes: -

1. It is caused by a herpes simplex type 2 virus.

2. It is transmitted by sexual contact.
3. In infected pregnant woman, virus can be transmitted to infant during birth.
4. It causes infection of genitalia.
5. It produces genital soreness and ulcers in the infected area.
6. It can cause damage to eyes and CNS of the infant of the infected woman.

2. Identical Twins: -

1. Identical twins are products of mitosis.
2. They are produced asexually.
3. They are formed when a single fertilized egg at two cell stage of cleavage (cell division) splits into two separate blastomeres, behaving as two independent zygotes and giving rise to two new individuals.
4. They have identical genetic make up.
5. They have same sex.
6. They usually share a placenta and amnion.

3. Tissue Culturing: -

1. Process of growing tissue artificially in liquid medium in laboratory glasswares is called tissue culture.
2. In tissue culture technique in plants, cambium tissue excised from plants can be stimulated by addition of nutrients, cytokinins, and IAA (indole acetic acid). These cells show continued growth and differentiate into a new plant, genetically identical to their parents.
2. Tissue culture is now widely used for the rapid propagation of desired varieties or for varieties difficult to propagate by cuttings.
3. Similar techniques have been developed for the tissue culture of animal cells. Or
1. Tissue culture is the growth of a tissue in artificial liquid or solid culture medium.
2. Tissue culture is a form of cloning in which cells in culture divide mitotically and each cell receives the diploid set of chromosomes.
3. Using the technique of tissue culture, large numbers of plants can be produced from small amounts of tissue.

4. Differences between Oviparous and Viviparous: -

See Lahore Board Answer No: 2

5. Apomixis: -

See Lahore Board Answer No: 27

6. Gonorrhea: -

1. It is caused by a gram positive bacterium *Neisseria gonorrhoeae*.
2. The bacterium mainly affects the mucous membrane of urinogenital tract.
3. New born infants acquire eye infection if they pass through the infected birth canal.
4. It is highly contagious through sexual contacts.

7. Spermatophytes: -

1. Spermatophytes are seed producing plants.
2. Spermatophytes are divided into two major groups, gymnosperms and angiosperms.

8. Implantation different from Gestation:

Implantation	Gestation
It is the attachment of embryo of about 128 cells called blastocyst in the thickened lining of the uterus for further growth and development..	It is the period of growth and development of a fetus in the uterus of a mammal upto birth after implantation of the embryo.

9. Placenta different from After birth: -

Placenta	After birth
1. Placenta is the tissue attaching the embryo to the wall of the uterus. 2. It is the start of pregnancy.	1. It is the detaching of the placenta from the uterine wall and its expulsion a short time after the birth of the baby. 2. It is the end of pregnancy.

10. Photoperiodism: -

- It is the response of organism to the relative duration of day and night. Or It is the influence of the relative lengths of day and night in the activities of an organism.
 - The length of the day or, under artificial conditions, period of exposure to light is called photoperiod.
 - Initiation of flowering at the shoot apical meristem is one of several physiological activities that are photoperiodic in many plants.
 - Plants are classified into three main groups---short-day, long-day and day-neutral—on the basis of photoperiodism affects.
 - Night length rather than day length is the important factor in inducing flower.
 - Measurement of the night length by plants involves a circadian clock.
 - The main photoreceptor for photoperiodism and many other-light initiated plant responses is phytochrome, a blue-green pigmented protein.
 - Phytochromes exist in two forms P_{660} and P_{730} . P_{660} is converted to P_{730} by red light and the reverse reaction is brought about by far-red light.
 - Biological clock once stimulated, causes production of chemical messenger.
 - Florigen is the chemical signal or messenger that stimulates flowering, transmitted from leaves to meristems via phloem. Or Photoperiodism is any response of the plant to the relative lengths of daylight and darkness. Initiation of flowering at the shoot apical meristem is one of the several photoperiodic activities in many plants.
- Plants are classified into three main groups---short-day, long-day and day-neutral—on the basis of how photoperiodism affects their transition from vegetative growth to flowering.

11. Diploid Parthenogenesis: -

See Lahore Board Answer No: 17

12. Role of Oxytocin: -

- It stimulates contraction of the uterine smooth muscle to help expel the infant during childbirth.
- It promotes ejection of the milk from the mammary glands (breasts) during breast-feeding.

13. Phytochromes: -

- Phytochromes are blue light sensitive pigments.
- Phytochromes exist in two forms P_{660} and P_{730} . P_{660} is converted to P_{730} by red light and the reverse reaction is brought about by far-red light.
- The presence of either from provides the plants with a means of detecting whether it is a light or dark environment.
- The rate at which P_{730} is converted to P_{660} provides the plant with a clock for measuring the duration of darkness.
- The biological clock once stimulated causes production of florigen hormone in leaves, which travels through phloem to the floral buds, initiating flowering. Or
- Phytochrome is blue-green pigment that absorbs the light stimulus in many light-mediated processes, such as induction of flowering.
- It is a dimer, consisting of two polypeptide chains, one of which is synthesized in the chloroplasts.
- A unique property of phytochrome is that it exists in photo-reversible states, P_{660} and P_{730} . P_{660} is converted to P_{730} by red light and reverse reaction is brought about by far red light.
- Phytochrome is involved in flowering. The active form (P_{730}) interacts with the oscillator (internal clock) to measure the length of the dark period and triggers flowering.
- It is also involved in a number of other plant growth processes such as germination of some kinds of seeds.

14. Differences between Oogenesis and**Spermatogenesis: -**

See Exercise Chapter No: 18 Answer No: 2

15. Genital Herpes: -

See Gujranwala Board Answer No: 1

16. Differences between Short Day Plants and Long Day Plants: -

Short Day Plants	Long Day Plants
1. They require short days and long nights for flowering.	1. They require long days and short nights for flowering.
2. They flower when photoperiod is less than a certain critical daylength (CDL).	2. They flower when photoperiod exceeds a certain critical daylength (CDL).
3. Dark period must be	3. Dark period must be

longer than some critical length. 4. Short day plants are actually long night plants. 5. They are typically autumn-flowering plants. 6. They are frequently of tropical or subtropical origin. 7. <i>Xanthium</i> (cocklebur), chrysanthemum, soyabean, tobacco and strawberry are examples.	shorter than some critical length. 4. Long day plants are really short night plants. 5. They typically include many spring and early summer flowering plants. 6. They are usually of temperate origin. 7. <i>Hyoscyamus</i> (henbane), cabbage, snapdragon, spring wheat and spring barley are examples.
--	--

17. Corpus luteum and its Function: -

See Lahore Board Answer No: 23

18. Apomixis: -

See Lahore Board Answer No: 27

19. Comparison of Oviparous with Viviparous: -

See Lahore Board Answer No: 2

20. Differences between Identical and Fraternal Twins: -

See Lahore Board Answer No: 6

21. Tissue Culture: -

See Gujranwala Board Answer No: 3

22. A) Menopause: -

The end or complete stop of the menstrual cycle is called menopause, after which the female stops producing the ova.

B) Menopause at which Age Starts: -

Menopause starts at the age of 40 or 45.

23. Test Tube Babies: -

See Lahore Board Answer No: 3

24. Differences Between Tissue Culture and Cloning: -

See Sargodha board Answer No: 14

25. Seed Dormancy: -

See Multan Board Answer No: 10

26. Syphilis: -

See Multan Board Answer No: 11

MULTAN BOARD QUESTIONS

- What is Follicle Atresia? (Multan Board 2008-A)
- Define the term Vernalisation. (Multan Board 2008-A)
- Write a short note on Parthenocarpy. (Multan Board 2008-S)
- Write about Gonorrhea. (Multan Board 2008-S)
- What are Genital herpes? (Multan Board 2009-A)
- What are the advantages of Photoperiodism and Vernalization. (Multan Board 2009-A)
- What is the importance of Vernalisation in agriculture? (Multan Board 2009-S)

- Define ovulation. (Multan Board 2010-A)
- Define Photoperiodism. (Multan Board 2010-A)
- Explain Seed Dormancy. (Multan Board 2010-A)
- Write a note on Syphilis. (Multan Board 2010-S)
- Where is florigen produced in plants? Write its role. (Multan Board 2010-S)
- What is Apomixis? (Multan Board 2011-A)
- Write about the Gonorrhea disease. (Multan Board 2011-A)
- Differentiate between Oviparous and Viviparous. (Multan Board 2011-A)
- Define Vernalization. (Multan Board 2011-S)
- Differentiate between Identical Twins and Triplets. (Multan Board 2011-S)
- Apomixis is a form of parthenogenesis. Discuss. (Multan Board 2011-S)
- What is After Birth? (Multan Board 2012-A)
- What are Test Tube Babies. (Multan Board 2012-A)
- Differentiate between Oviparity and Viviparity. (Multan Board 2012-A)
- What is genital herpes? (Multan Board 2012-S)
- Define parthenocarpy with examples. (Multan Board 2012-S)
- Write a short note on Vernalization. (Multan Board 2012-S)
- Differentiate between parthenocarpy and parthenogenesis. (Multan Board 2013-A)
- Differentiate between identical and fraternal twins. (Multan Board 2013-A)
- Define cloning. Describe briefly cloning technique in vertebrates. (Multan Board 2013-A)
- What is Follicle Atresia? (Multan Board 2013-S)
- Differentiate between Oviparous and Viviparous. (Multan Board 2013-S)
- Define Parthenocarpy with examples.

- (Multan Board 2013-
S)
31. What is Genital Herpes?
(Multan Board (New Scheme) 2014-
A)
32. What are Oviparous and Viviparous animals?
(Multan Board (New Scheme) 2014-
A)
33. Define Parthenocarp with examples.
(Multan Board (New Scheme) 2014-
A)
34. What are Viviparous Animals?
(Multan Board (Old Scheme) 2014-
A)
35. What are Fraternal Twins?
(Multan Board (Old Scheme) 2014-
A)
36. Name different methods of asexual reproduction:
(Multan Board (Old Scheme) 2014-
A)
37. What is After birth?
(Multan Board-New Scheme-2015-
A)
38. Define Fruit set.(Multan Board-New Scheme-2015-
A)
39. Define Diploid Parthenogenesis with example.
(Multan Board-New Scheme-2015-
A)

Answers

1. **Follicle Atresia:** -
Only one of many developing follicles continue to grow with its primary oocytes while the rest breakdown by a degenerative process known as follicle atresia.
2. **Vernalisation:** -
See Lahore Board Answer No: 13
3. **Parthenocarp:** -
See Lahore Board Answer No: 7
4. **Gonorrhea:** -
See Gujranwala Board Answer No: 6
5. **Genital Herpes:** -
See Gujranwala Board Answer No: 1
6. **Advantages of Photoperiodism and Vernalization:** -
1. They ensure reproduction at favorable times of year.
2. They also ensure the members of the same species flower at the same time, encouraging cross-pollination ensuring genetic variability.
7. **Importance of Vernalisation in Agriculture:** -
1. Vernalisation has found great application in Russia and other countries in the development of crop production.
2. Pine seeds are chilled during germination.
3. Turnip, sugar beet, etc. flower after exposing to cold winter.
8. **Ovulation:** -
1. It is the release of an ovum from the ovary.
Or
The process in which graffian follicle of the ovary ruptures and the mature ovum is released is called Ovulation. Or
The process in which follicle bursts and releases the

ovum with its coating of cells into funnel of oviduct is

- called ovulation.
2. It occurs 14 days after the onset of menstruation.
3. LH causes ovulation.
9. **Photoperiodism:** -
See Gujranwala Board Answer No: 10
10. **Seed Dormancy:** -
1. Seed dormancy is a special conditions of rest, which enables an embryo to survive the long periods of unfavorable environmental, such as water scarcity or low temperature.
2. During this period of rest embryo ceases or limits its growth.
3. This is of great survival importance to the plant in that it prevents the dormant seed from germinating in response to conditions such as warm spell in winter, which, although apparently favorable, are only temporary.
4. Germination or resumption of normal growth by a dormant embryo requires certain, very precise combination of environmental cues, to avoid any accidental stimulus which may prove fatal later on.
11. **Syphilis:** -
1. It is caused by a spirochaete *Treponema pallidum*.
2. It damages the reproductive organs, eyes, bones, joint, central nervous system, heart and skin.
3. Sexual contact is the major source of its transmission.
12. **A) Where Florigen Produced:** -
Florigen is produced in leaves.
B) Role of Florigen: -
It initiates flowering.
13. **Apomixis:** -
See Lahore Board Answer No: 27
14. **Gonorrhea:** -
1. It is a disease caused by a bacterium *Neisseria gonorrhoeae*.
2. The bacterium is introduced in the body through sexual contact, usually through genital and oral contact.
3. An infected mother can transmit these bacteria to her baby while he or she is being delivered.
4. The bacteria cause wounds in genital tubes.
5. Infected male experience burning sensation during urination with discharge of white pus from urethra.
6. The oviducts of infected females become damaged and blocked. If untreated can cause infertility in females.
7. The babies which pass through birth canal of infected mother more often suffer from eye infections and can become blind if not treated immediately.
15. **Differences between Oviparous and Viviparous:** -
See Lahore Board Answer No: 2
16. **Vernalization:** -
1. It is the induction of flower by period of cold.
2. Chilling (period of cold) acts directly on the apical

- meristem.
3. Many plants have a vernalization requirement for flowering. For example, in carrots, swedes, and other biennials, the first year's growth is vegetative in which they store energy reserves. Flowering occurs on the second year, but only if the plant is first subjected to several weeks of cold (1-7 °C, usually 4 °C), and some biennials fail to flower in the second year if the winter is too mild.
4. A vernalisation requirement is not limited to mature plants. It is necessary for some seeds also. The cold has to be applied just as the radicle starts to emerge, and it should be continued for several weeks. A temperature about freezing (1-10 °C) is required.
- a. Pine seeds, for example, will not germinate if not exposed to cold treatment.
- b. Seeds of winter annuals, such as some cereal varieties sown in the autumn, flower the following spring. If previously soaked seeds are chilled, they can be planted in the spring and flower the same year.
5. Some plants require chilling followed by appropriate photoperiods to flower. Henbane, an introduced weed, requires long days to flower, but only if these are preceded by chilling.

17. Differences between Identical Twins and Triplets: -

Identical Twins	Triplets
1. Sometimes two blastomeres of a fertilized egg at early stage of cleavage separate. These develop into two separate embryos giving rise to identical twins.	1. Sometimes a woman releases three ova when she ovulates. If all these ova are fertilized, they may form three embryos, giving rise to triplets.
2. They are genetically identical to each other.	2. They are all genetically different from one another.
3. They must be of same sex.	3. They need not be of same sex.
4. They are product of asexual reproduction (mitosis).	4. They are product of sexual reproduction.

18. Apomixis, a form of Parthenogenesis:

Apomixis is a form of parthenogenesis because embryo in seeds develops from a diploid cell in the ovule rather than from a diploid zygote that forms from the union of haploid gametes.

19. After Birth: -

See Lahore Board Answer No: 15 (B)

20. Test Tube Babies: -

See Lahore Board Answer No: 3

21. Differences between Oviparity and Viviparity: -

Oviparity	Viviparity
1. Oviparity refers to a type of reproduction in which the eggs are developed after leaving the body of the mother.	1. Viviparity refers to reproduction in which eggs develop within the mother's body and young are born free-living.

2. Eggs may or may not be surrounded by shell.
3. Fertilization is external in some and internal in others.
4. Development of young take place outside the mother body in the laid eggs.
5. During development young obtain nourishment from the egg yolk.
6. The animals laying eggs are called oviparous.
7. Oviparity is found in some bony fish, most reptiles, some cartilaginous fish, some amphibians, a few mammals, and all birds.
2. Eggs are without shell.
3. Fertilization is internal in all.
4. Young develop inside the parent.
5. The young obtain nourishment directly from the mother's body rather than from egg yolk.
6. The animals giving birth to young ones are called viviparous.
7. Viviparity is found in most cartilaginous fish, some amphibians, a few reptiles, and almost all mammals.

22. Genital Herpes: -

See Gujranwala Board Answer No: 1

23. Parthenocarp with Examples: -

See Lahore Board Answer No: 7

24. Vernalization: -

See Lahore Board Answer No: 13

25. Differences between Parthenocarp and Parthenogenesis: -

Parthenocarp	Parthenogenesis
1. It is development of fruit without fertilization.	1. It is development of an individual without fertilization.
2. It occurs in plants.	2. It occurs in animals.

26. Differences between Identical and Fraternal Twins: -

See Lahore Board Answer No: 6

27. A) Cloning: -

Cloning is the production of duplicate copies of genetic material (DNA), cells, entire multicellular organism, all derived from a common ancestor.

B) Cloning Technique in Vertebrates: -

In animals and especially among vertebrates, a nucleus from the somatic cell is removed and introduced into an egg cell, whose nucleus has been destroyed by ultraviolet radiation. The egg with transplanted diploid somatic cell nucleus develops into

an organism, genetically identical to the parent who has contributed the nucleus.

28. Follicle Atresia: -

See Multan Board Answer No: 1

29. Differences between Oviparous and Viviparous: -

See Lahore Board Answer No: 22

30. Parthenocarp with Examples: -

See Lahore Board Answer No: 7

31. Genital Herpes: -

See Gujranwala Board Answer No: 1

32. A) Oviparous Animals: -

In terrestrial conditions fertilization is internal. Sperms are lodged in the female body where fertilization occurs. This may lead to external

development as in reptiles and birds. They lay shelled

eggs to protect the developing embryo from harsh terrestrial conditions. Such animals are called oviparous. Or

1. The animals, which lay eggs and in which the whole development proceeds within the egg, are known as oviparous animals and the condition is called oviparity.

2. Some bony fish, most reptiles, some cartilaginous fish,

some amphibians, a few mammals, and all birds are oviparous animals.

3. In most bony fishes, fertilization is external. Fertilization is also external in most amphibians.

Most

reptiles and all birds practice internal fertilization.

4. Eggs of fishes and amphibians are non-shelled while those of reptiles and birds have calcareous shell.

B) Viviparous Animals: -

In mammals internal fertilization leads to internal development and the development of the embryo is accomplished inside the female body, which gives birth to young one-such animals are called

oviparous.

Or

1. The animals in which the whole development of the young ones proceeds inside the body of the mother and mother eventually gives birth to the young ones, are called Viviparous animals while the condition is known as viviparity.

2. Most cartilaginous fish, some amphibians, a few reptiles, and almost all mammals are viviparous animals.

3. Young leave the body of the mother (in sea horses, the

father) at an advanced stage of development, obtaining

nutrient from the parent before birth.

4. Young are nourished inside the mother as well as protected.

5. In some cases nutrients are secreted by the lining of the female reproductive tract and diffuse across to embryo. In some species nutrients are delivered to the embryo by means of a vascular connection, a placenta.

33. Parthenocarp with Examples: -

See Lahore Board Answer No: 7

35. Fraternal Twins: -

In some cases, two eggs are produced by the female and both these eggs are independently fertilized forming two zygotes. These zygote develop into

new offspring, but with their different genetic combinations.

Such a twins are called identical twins. They are produced sexually. Or

Sometimes a woman releases two ova, when she ovulates. If both ova are fertilized, they may form twin embryos, each with its own placenta and

amnion.

Because twin come from two separate ova, each fertilized by different sperm, it is possible to have a

boy and girl. Twins formed in this way are called Fraternal twins.

36. Names of Different Methods of Asexual Reproduction: -

a. Natural: -

1. Fission
2. Budding
3. Regeneration
4. Apomixis
5. Parthenocarp
6. Parthenogenesis

b. Artificial: -

1. Cloning
2. Tissue culture
3. Parthenocarp

37. After Birth: -

See Lahore Board Answer No: 15 (B)

38. Fruit Set: -

1. It is retention of the ovary which becomes the fruit after fertilization.
2. Production of auxin by germinating pollen grain, the tissues of style and ovary is necessary for fruit set.
3. Auxin is continually produced by the ovary and the ripe seed after fertilization, which stimulates fruit development.

4. Auxins, and other growth substances (giberrellins and

cytokinins) are produced by developing seeds that are

mainly associated with development of embryo and accumulation of food reserves in the seed, and sometimes in the pericarp (fruit wall).

5. Another plant hormone, ethane, is associated with climactic (burst of respiratory activity) and helps in ripening of the fruit.

39. Diploid Parthenogenesis with Example: -

See Lahore Board Answer No: 17

BAHAWALPUR BOARD QUESTIONS

1. What is menopause? (Bahawalpur Board 2008-A)

2. Explain the disease syphilis. (Bahawalpur Board 2008-A)

3. Write a short note on seed dormancy. (Bahawalpur Board 2008-S)

4. Write shortly on Vernalisation. (Bahawalpur Board 2008-S)

5. Differentiate between Identical Twins and Fraternal Twins. (Bahawalpur Board 2009-S)

6. State the significance of Testosterone in humans. (Bahawalpur Board 2009-S)

7. What is Diplohaplontic Life Cycle? (Bahawalpur Board 2010-A)

8. Discuss Ovoviviparous condition. (Bahawalpur Board 2010-A)

9. How will you explain "After Birth"? (Bahawalpur Board 2010-A)

- (Bahawalpur Board 2010-
A)
10. What is Pollen Tube? Give its importance in plants.
(Bahawalpur Board 2010-
S)
11. Write the significance of Vernalization.
(Bahawalpur Board 2010-
S)
12. Write the disadvantages of Asexual Reproduction.
(Bahawalpur Board 2010-
S)
13. Define Apomixis. (Bahawalpur Board 2011-
A)
14. Give two disadvantages of Cloning.
(Bahawalpur Board 2011-
A)
15. Differentiate between Lactation and Gestation.
(Bahawalpur Board 2011-
A)
16. Define Seed Dormancy.
(Bahawalpur Board 2012-
A)
17. Define Labour Pain.
(Bahawalpur Board 2012-
A)
18. Why seed plants are predominantly present all
around
us? (Bahawalpur Board 2012-
A)
19. Explain After Birth? (Bahawalpur Board 2013-
A)
20. What is Diploid Parthenogenesis and give its
example.
(Bahawalpur Board 2013-
A)
21. Define Climacteric and give its example.
(Bahawalpur Board 2013-
A)
22. Briefly describe Vernalization
(Bahawalpur Board-New Scheme-2014-
A)
23. How test tube babies are produced?
(Bahawalpur Board-New Scheme-2014-
A)
24. What is the cause and effect of Syphilis?
(Bahawalpur Board-New Scheme-2014-
A)
25. What is Vernalisation?
(Bahawalpur Board-New Scheme-2015-
A)
26. What is Oestrous Cycle?
(Bahawalpur Board-New Scheme-2015-
A)
27. What is Gonorrhea?
(Bahawalpur Board-New Scheme-2015-
A)

Answers

1. **Menopause:** -
See Lahore Board Answer No: 15
2. **Syphilis:** -
1. It is caused by a spirochaete *Treponema pallidum*.
2. Usual source of transmission is genital and mucous
lesion. Congenital transmission is also found in

- syphilis.
3. Syphilis has many stages typically separated by
latent
periods. In the early stages of syphilis there are
painless skin and bone lesions. The spirochetes
almost
certainly become blood-borne early in the infection
and therefore reach all tissues of the body. In the late
stages there are destructive lesions of skin, bone,
and
other tissues and lesions of the heart and brain.
Death
results in 5-10 % of untreated cases.
3. **Seed Dormancy:** -
See Multan Board Answer No: 10
4. **Vernalization:** -
See Lahore Board Answer No: 13
5. **Differences between Identical Twins and
Fraternal
Twins:** -
See Lahore Board Answer No: 6
6. **Significance of Testosterone in Humans:** -
1. It is essential for the successful production of
sperms.
2. It controls the development of male secondary
sexual
characteristics during puberty. Or
1. It initiates the development of sex organs in the
fetus.
1. It produces sperms.
2. It brings about development of the male secondary
sexual characteristics.
3. It promotes sex derive.
7. **Diplohaplontic Life Cycle:** -
See Lahore Board Answer No: 16
8. **Ovoviviparous Condition:** -
See Lahore Board Answer No: 14
9. **After Birth:** -
See Lahore Board Answer No: 15 (B)
10. **A) Pollen Tube:** -
1. It is a tube formed after germination of pollen grain
that carries the male gametes into the ovule. Or
It is a tube that forms when a pollen grain lands on
the
stigma and germinates. The tube grows passing
between the cells of the stigma and style to reach the
egg inside the ovule, where fertilization occurs.
Or
It is a tube or extension in the gymnosperms and
angiosperms that forms after germination of the
pollen
grain and through which male gametes (sperm cells)
pass into the ovule.
2. The pollen tube carries two sperms.
B) Importance of Pollen Tube in Plants: -
Pollen tube acts a vehicle for male gametes for their
safe transfer to female gamete in ovule in hostile
land
environment. The evolution of pollen tube is parallel
to the evolution of seed and is a tool of success for
seed plants. Or
Pollen tube acts as vehicle for sperms. The
evolution

of pollen tubes parallels the evolution of seeds. The egg produced inside an ovule is very well protected in

the ovule. It is so well protected that a flagellated sperm would not have slightest chance of even reaching an egg. This obstacle has been overcome by

the development of pollen tubes.

11. Significance of Vernalization: -

1. It shortens the vegetative period and hastens flowering. For example, seeds of winter varieties of wheat when sown in the autumn, usually flower the following spring. If previously soaked seeds are chilled, they can be planted in the spring and flower the same year.

2. It ensures reproduction at favorable times of year.

3. It also ensures that members of the same species flower at the same time, encouraging cross

pollination

for genetic variability.

12. Disadvantages of Asexual Reproduction: -

In asexual reproduction, increase in number of individual is very rapid that is not an adaptive method

and may at sometime jeopardize the survival of a species.

13. Apomixis: -

See Lahore Board Answer No: 27

14. Two Disadvantages of Cloning: -

1. One of the many disadvantages of cloning is that if a clone has no resistance to a particular disease, the whole population could be wiped out.

2. If some breed die out there is less variety in the population, so natural selection can not occur properly.

15. Differences between Lactation and Gestation: -

See Lahore Board Answer No: 8

16. Seed Dormancy: -

Seed Multan Board Answer No: 10

17. Labour Pain: -

Rhythmic involuntary contractions of uterus during birth are experienced as pain known as labor pain.

Or

Child birth begins when the muscles of the uterus contract and relax, these actions are felt as pain known

as labor pain.

18. Seed Plants Predominantly Present: -

The survival value of seeds largely accounts for the dominance of seed plants. Or

Seed plants are predominantly present around us because:

1. Their gametophyte generation is very reduced and is well protected inside sporophyte tissue, on which it

is

totally dependent.

2. Fertilization is not dependent on water as in other groups. Male sperms are well protected in pollen grain

and are safely transferred by means of pollen tube in the embryo sac near the ovum.

3. Seeds afford maximum protection to the young plant at its most vulnerable stage of development.

4. Seeds contain food that contain stored food that permits a young plant to develop before photosynthetic activity begins.

5. Seeds are adapted for dispersal, facilitating the migration of plant genotypes into new habitats.

19. After Birth: -

See Lahore Board Answer No: 15 (B)

20. Diploid Parthenogenesis with Example: -

See Lahore Board Answer No: 17

21. Climacteric with Example: -

1. It is a burst of respiratory activity which is associated

with ethene production and fruit ripening. Or

It is a period of increased respiration involved in ripening of fruit.

2. During climacteric, ripening fruits undergo an integrated set of changes, including a decline in organic acid, an increase in sugar content, softening and often a color change.

3. During climacteric there is also a dramatic increase in

ethene production.

22. Vernalization: -

See Lahore Board Answer No: 13

23. How Test Tube Babies Produced: -

Following steps take place in the production of test tube babies.

- a. In the first step, the woman is given fertility drugs which cause her ovaries to release several mature

ova

simultaneously.

- b. These ova are then collected by laparoscopy, i.e. they are sucked up in a fine tube inserted through the abdominal wall.

- c. The ova are then mixed with the husband's seminal fluid and watched under the microscope as to see if cell division takes place.

- c. Embryos are screened for chromosome or gene abnormalities..

- d. One or more healthy embryos (or dividing zygotes) are transferred to the woman's uterus by means of a tube inserted through the cervix. Usually, only one

(or

none) of the zygote develops though, occasionally, there are multiple birth. The success rate of test tube babies is about 31 %.

24. A) Cause of Syphilis: -

The causative agent of syphilis is *Treponema pallidum*.

B) Effects of Syphilis: -

1. It damages the reproductive organs, eyes, bones, joint,

central nervous system, heart and skin.

2. An infected person may become mentally retarded, become blind, and walk with shuffle.

3. Infected mother can cause damage to heart, eyes, and

nervous system of the baby.

25. Vernalisation: -

See Lahore Board Answer No: 13

26. Oestrous Cycle: -

See Lahore Board Answer No: 24

27. Gonorrhea: -

See Gujranwala Board Answer No: 6

FAISALABAD BOARD QUESTIONS

1. What do you learn about test tube babies?
(Faisalabad Board 2008-A)
2. What is the significance of the evolution of pollen tube?
(Faisalabad Board 2008-A)
3. Explain the term Parthenocarp?
(Faisalabad Board 2009-A)
4. Define Vernalisation.
(Faisalabad Board 2009-A)
5. Differentiate between Oviparous and Viviparous.
(Faisalabad Board 2009-A)
6. Explain Climacteric.
(Faisalabad Board 2010-A)
7. Explain Vernalisation.
(Faisalabad Board 2010-A)
8. Differentiate between internal and external fertilization.
(Faisalabad Board 2010-A)
9. Write about disease Syphilis.
(Faisalabad Board 2011-A)
10. What is menopause?
(Faisalabad Board 2011-A)
11. Distinguish between vernalization and seed dormancy.
(Faisalabad Board 2011-A)
12. Explain briefly vernalization.
(Faisalabad Board 2012-A)
13. What are the functions of sertoli cells?
(Faisalabad Board 2012-A)
14. Name the hormones secreted by placenta.
(Faisalabad Board 2012-A)
15. Define haploid parthenogenesis.
(Faisalabad Board 2013-A)
16. What are ovoviviparous?
(Faisalabad Board 2013-A)
17. Give two disadvantages of cloning.
(Faisalabad Board 2013-A)
18. Give significance of evolution of pollen tube in seed plants.
(Faisalabad Board (Old Scheme) 2014-A)
19. What are fraternal twins?
(Faisalabad Board (Old Scheme) 2014-A)
20. Differentiate between menstruation and menopause.
(Faisalabad Board (Old Scheme) 2014-A)
21. Write a note on test tube baby.
(Faisalabad Board (New Scheme) 2014-A)
22. What is tissue culture? Explain.

(Faisalabad Board (New Scheme) 2014-

- A)
23. What is menopause? At what age it starts?
(Faisalabad Board (New Scheme) 2014-A)
24. What is parthenocarp?
(Faisalabad Board-New Scheme-2015-A)
25. Give the importance of asexual reproduction.
(Faisalabad Board-New Scheme-2015-A)
26. Differentiate between oviparity and viviparity.
(Faisalabad Board-New Scheme-2015-A)

Answers

1. **Test Tube Babies: -**
See Lahore Board Answer No: 3
2. **Significance of the Evolution of Pollen Tube: -**
See Bahawalpur Board Answer No: 10 (B)
3. **Parthenocarp: -**
See Lahore Board Answer No: 7
4. **Vernalization: -**
See Lahore Board Answer No: 13
5. **Differences between Oviparous and Viviparous: -**
See Lahore Board Answer No: 22
6. **Climacteric: -**
See Bahawalpur Board Answer No: 21
7. **Vernalization: -**
See Lahore Board Answer No: 13
8. **Differences between Internal and External Fertilization: -**

Internal Fertilization	External Fertilization
<ol style="list-style-type: none"> 1. It is the union of gametes inside the body of the female. 2. It occurs in many aquatic and some land animals. 3. Sperms are lodged in the female body at more or less the same time when eggs are released for fertilization. 4. It leads to external development in reptiles and birds and internal development in mammals. 5. In internal fertilization, usually one or few female gametes are produced. 6. Examples include nematodes, some mollusks, arthropods, most bony fishes, most amphibians, all reptiles, birds and mammals. 	<ol style="list-style-type: none"> 1. It is the union of gametes outside the body. 2. It occurs in all land animals and some aquatic animals. 3. Sperms and eggs are shed in the water at the same time and at the same place 4. It leads only to the external development. 5. In external fertilization, a large number of both gametes are produced. 6. Examples include most cartilaginous fishes and most amphibians.

9. **Syphilis: -**
See Multan Board Answer No: 11
10. **Menopause: -**
See Lahore Board Answer No: 15 (A)
11. **Differences between Vernalization and Seed Dormancy: -**

Vernalisation	Seed Dormancy
---------------	---------------

1. It is the chilling treatment to the seed embryo or the apical meristem of a mature stem for the induction of flower in the later stages.	1. It is the period of rest of the seed embryo which ceases or limits its growth.
2. Cold (chilling) and photoperiods (sometimes) are the stimuli for flowering.	2. Cold, temperature and other environmental cues are the stimuli for seed dormancy.

12. Vernalization: -

See Lahore Board Answer No: 13

13. Functions of Sertoli Cells: -

- Fluid secreted by sertoli cells provide liquid medium, protection and nourishment to sperms while they are in the tubules. Or
- Sertoli cells provide nourishment for developing sperm cells.
 - Sertoli cells engulf cytoplasm extruded from the spermatids during their remodeling and they also destroy defective germ cells that fail to successfully complete all stages of spermatogenesis
 - Sertoli cells secrete the lumen seminiferous tubule fluid, which flushes the released sperm from the tubule into epididymis for storage and further processing.
 - It maintains a very high level of testosterone which is 100 times more concentrated in the seminiferous tubules than in the blood.

14. Names of the Hormones secreted by Placenta: -

- Estrogen
- Progesterone
- Chorion gonadotropin
- Placental lactogen

15. Haploid Parthenogenesis: -

- Parthenogenesis in which haploid egg develops into haploid individual without its fertilization by the haploid male gamete is called Haploid parthenogenesis.
- It occurs in ants, bees, and wasps.
- The queen bee, receives sperms from a drone bee male and stores them in a pouch closed off in a valve. She has the ability to lay eggs that have not been fertilized.

When she lays egg without being fertilized they develop into haploid male drones. Or

- Haploid parthenogenesis is common among insects (especially honeybees, wasps) and other arthropods.
- In honeybees, for example, a queen bee mates only once and stores the sperm. She then can control the release of the sperm. If no sperm are released, the eggs develop parthenogenetically into drones which are males. If sperms are allowed to fertilize the eggs, the fertilized eggs develop into other diploid queens or diploid worker bees which are female.

16. Ovoviviparous: -

See Lahore Board Answer No:14

17. Two Disadvantages of Cloning: -

- Rapid aging
- Low resistance to environmental stress and diseases

18. Significance of Evolution of Pollen Tube in Seed Plants: -

See Bahawalpur Board Answer No: 10 (B)

19. Fraternal Twins: -

See Multan Board Answer No: 35

20. Differences between Menstruation and Menopause:

Menstruation	Menopause
1. It is monthly discharge of blood and degenerated uterine lining in the menstrual cycle of human female.	1. It is the period in women when the recurring menstrual cycle ceases.
2. Appearance of first menstruation marks the beginning of each menstrual cycle and is one of the signs of puberty.	2. Gradual stop of menstruation marks the beginning of menopause and is the sign of infertility in older women.
3. It occurs between 15 and 40 of age.	3. It occurs between 40 and 55 of age.
4. It lasts for 7 days.	4. It lasts for 15 years.

21. Note on Test Tube Baby: -

Parents which are unable to enjoy the normal process of fertilization and birth of their offspring due to some physiological and physical abnormalities in any two parents are being benefited with the method of test tube baby. It is the method of fertilization of eggs in a test tube. Its success rate is about 31 %. In this method, the woman is given fertility drugs which cause her ovaries to release several mature ova simultaneously. The ova are removed and fertilized with sperms. One or more of the dividing zygotes are then introduced into woman's uterus by means of a tube inserted through the cervix. Placenta is established and remaining development takes place in the body of the mother leading to normal birth.

22. Tissue Culture: -

See Gujranwala Board Answer No: 3

23. Menopause and the Age at which Starts: -

See Gujranwala Answer No: 22

24. Parthenocary: -

See Lahore Board Answer No: 7

25. Importance of Asexual Reproduction: -

- An advantage of asexual reproduction is that the organisms increase in number very rapidly which are morphologically and genetically alike to their parent. However, this blocks the process of evolution and adaptation and it may destroy the survival of species at any stage.
- Man uses this method for the production of the same type of crop by tissue culturing in plants.
- Moreover, cloning in animals (a type of asexual

reproduction) is being adapted for producing organisms of valuable characteristics, without a change in their genetic make up.

26. Differences between Oviparity and Viviparity: -
See Multan Board Answer No: 21

RAWALPINDI BOARD QUESTIONS

1. What is follicle atresia?
(Rawalpindi Board 2010-
A)
2. What is Genital herpes?
(Rawalpindi Board 2010-
A)
3. Write a short note on Vernalisation.
(Rawalpindi Board 2010-
A)
4. Define menstrual cycle and menopause.
(Rawalpindi Board 2011-
A)
5. Name various parts of male reproductive system of man.
(Rawalpindi Board 2011-
A)
6. What is apomixis?
(Rawalpindi Board 2011-
A)
7. Differentiate between oogenesis and spermatogenesis.
(Rawalpindi Board 2012-
A)
8. Define estrous cycle.
(Rawalpindi Board 2012-
A)
9. Define apomixis.
(Rawalpindi Board 2012-
A)
10. What is test tube baby?
(Rawalpindi Board 2013-
A)
11. Give some control of AIDS.
(Rawalpindi Board 2013-
A)
12. What is cloning? What are its advantages?
(Rawalpindi Board 2013-
A)
13. Define APOMIXIS.
(Rawalpindi Board-New Pattern-2014-
A)
14. What is oestrous cycle?
(Rawalpindi Board-New Pattern-2014-
A)
15. Differentiate between Fraternal and Identical Twins.
(Rawalpindi Board-New Pattern-2014-
A)
16. How process of child birth is initiated in human?
(Rawalpindi Board-New Pattern-2015-
A)
17. Define Gestation period and After birth.
(Rawalpindi Board-New Pattern-2015-
A)
18. What is Oestrous cycle?
(Rawalpindi Board-New Pattern-2015-
A)

Answers

1. **Follicle Atresia: -**
1. Follicle atresia is degenerative process in which all developing follicles except one break down.
2. Developing follicles usually degenerate and become scar tissue by atresia.

3. Until puberty all the follicles that start to develop undergo atresia in the early stages without ever ovulating.
4. Even for the first few years after puberty, many of the cycles are without ovum.

2. Genital Herpes: -

1. It is caused by a virus Herpes simplex type 2.
2. Sexual partners or newborn baby receives genital herpes from body fluids or genital fluids.
3. In sexual partners, it is characterized by painful blisters and ulcers on or around external genital organs, fever, pain on urination, swollen lymph nodes in the groin and in women, a copious discharge.
4. In new born babies, it can cause damage to eyes and an infection that leads to neurological disorder and even death.

3. Vernalization: -

See Lahore Board Answer No: 13

4. A) Menstrual Cycle: -

It is a periodic reproductive cycle in human females which is completed in approximately 28 days and involves changes in the structure and function of whole reproductive system and is marked by periodic bleeding from the uterus. Or
At puberty monthly rhythmic changes in the rates of secretion of the female hormones and corresponding physical changes in the ovaries and other sexual organs occur in the human females. This rhythmic pattern is called menstrual cycle, most accurately, female monthly sexual cycle. The duration of cycle averages 28 days. It may be as short as 20 days or as long as 45 days even in normal women, although abnormal cycle length is frequently associated with decreased fertility.

B) Menopause: -

See Lahore Board Answer No: 15 (A)

5. Names Various Parts of Male Reproductive System

of Man: -

1. External genitalia
 - a. A pair of testes
 - b. Scrotum
 - c. Penis
2. Sperm duct
3. Urinogenital duct
4. Glands
 - a. Seminal vesicles
 - b. Prostate gland
 - c. Bulbourethral gland

6. Apomixis: -

See Lahore Board Answer No: 27

7. Differences between Oogenesis and Spermatogenesis: -

See Exercise Chapter No: 18 Answer No: 2

8. Estrous Cycle: -

1. A period of increased mating desire found in mammals except primates is called as Oestrous or Heat period.
2. The structural and physiological changes occurring from one period of oestrous to the next is called as

Oestrous Cycle.

3. The estrogen prepares the uterus for conception, follicles develop ova and ovulation generally occurs during the period of estrous..
4. The cycles of these animals vary in length and frequency.
5. Oestrous cycle may occur only once a year in some mammals and in others twice a year and in some more

often.

5. In dogs, estrous cycle occurs only twice a year.

9. Apomixis: -

See Lahore Board Answer No: 27

10. Test Tube Baby: -

See Lahore Board Answer No: 3

11. Some Control Measures of AIDS: -

1. Avoid sexual contacts with carrier or diseased person.
2. Adopt the hygienic conditions.
3. Avoid sharing of blood-contaminated needles or syringes. Always use sterilized needles.
4. Mothers contracting HIV must not feed their babies.
5. Health workers must practice infection control measures.
6. There must be wide public awareness of the nature and transmission of AIDS.

12. A) Cloning: -

See Lahore Board Answer No: 5

B) Advantages of Cloning: -

1. Cloning in animals is being adapted for producing organisms of valuable characteristics, without change in their genetic make up.
2. It has the advantage that all the offspring behave similarly.

13. Apomixis: -

See Lahore Board Answer No: 27

14. Oestrous Cycle: -

See Rawalpindi Board Answer No: 8

15. Differences between Fraternal and Identical Twins: -

See Lahore Board Answer No: 6

16. Process of Child Birth Initiation in Human: -
Process of child birth is initiated in human in the following way:

1. First ACTH is released from the fetal pituitary gland.
2. ACTH in turn stimulates the fetal adrenal gland to release corticosteroids.
3. Corticosteroids cross the placenta barrier and enter the maternal blood circulation causing a decrease in maternal progesterone production.
4. Reduction of progesterone level in the mother stimulates the pituitary gland to release oxytocin hormone that induces labor pains in the mother initiating the actual process of child birth.

17. A) Gestation Period: -

1. The period starting from conception upto the birth of baby is called Gestation period.
2. It is commonly known as pregnancy period.
3. The total gestation period in humans is usually about 280 days.

B) After Birth: -

The detaching of the placenta from the uterine wall and its expulsion a short time after the birth of the baby is called After Birth.

18. Oestrous Cycle: -

See Bahawalpur Board Answer No: 8

SARGODHA BOARD QUESTIONS

1. Give significance of Vernalisation?
(Sargodha Board 2010-
A)
2. Differentiate between haploid parthenogenesis and diploid parthenogenesis.
(Sargodha Board 2010-
A)
3. What are phytochromes? Which phytochrome is active during night?
(Sargodha Board 2010-
A)
4. Define Oestrous Cycle.
(Sargodha Board 2011-
A)
5. State two methods of asexual reproduction Animals.
(Sargodha Board 2011-
A)
6. What is the role of P730 phytochrome in flowering?
(Sargodha Board 2011-
A)
7. Differentiate between oestrous cycle and menstrual cycle.
(Sargodha Board 2012-
A)
8. Name the hormones that stimulate mammary glands for lactation.
(Sargodha Board 2012-
A)
9. What is the role of interstitial cells in sperm production?
(Sargodha Board 2012-
A)
10. Define parthenogenesis. How does it differ from apomixis?
(Sargodha Board 2013-
A)
11. What is seed dormancy? Why is it essential for plants?
(Sargodha Board 2013-
A)
12. Write down diploid parthenogenesis with an example.
(Sargodha Board 2013-
A)
13. Define Lactation.
(Sargodha Board (New Scheme) 2014-
A)
14. Differentiate between tissue culture and cloning.
(Sargodha Board (New Scheme) 2014-
A)
15. What do you mean by menopause?
(Sargodha Board (New Scheme) 2014-
A)

Answers

1. Significance of Vernalisation: -

See Bahawalpur Board Answer No: 11

2. Differences between Haploid Parthenogenesis and

Diploid Parthenogenesis: -

Haploid Parthenogenesis	Diploid Parthenogenesis
<ol style="list-style-type: none"> 1. Haploid eggs are produced by meiosis. 2. Haploid egg develops without fertilization into haploid drone male. 3. It is found in ants, bees and wasp. 	<ol style="list-style-type: none"> 1. Diploid eggs are produced by a modified form of meiosis involving total non-disjunction of chromosomes. 2. Diploid egg without fertilization develops into diploid female. 3. It is found in aphids.

3. A) Phytochromes: -

See Gujranwala Board Answer No: 13

B) Phytochrome Active during Night: -

P₇₃₀ are active during night.

4. Oestrous Cycle: -

See Lahore Board Answer No: 24

5. Two Methods of Asexual Reproduction in Animals:

1. Parthenogenesis: -

1. It is a type of asexual reproduction in which eggs are developed into individuals without being fertilized.
2. In majority of cases of parthenogenesis (haploid parthenogenesis) haploid eggs are produced by meiosis but in some (diploid parthenogenesis) cases diploid eggs are produced by a modified form of meiosis involving total non-disjunction of the chromosomes.
3. Haploid eggs develop into haploid drone males while diploid eggs develop into young females.
4. Haploid parthenogenesis is found in ants, bees and wasps, while diploid parthenogenesis is found in aphids.
5. Parthenogenesis has the advantage of accelerating the normal reproductive rate.

2. Cloning: -

1. It is also a method of asexual reproduction in which organisms are produced from a single parent.
2. In animals, and especially among vertebrates, a nucleus from somatic cell is removed and introduced into egg cell, whose own nucleus has been destroyed by ultra violet radiation. The egg with transplanted diploid somatic cell nucleus develops into an organism, genetically identical to the parent who has contributed the nucleus.

6. Role of P₇₃₀ Phytochrome in Flowering: -

P₇₃₀ is the active form of phytochrome and its level in the plant at the end of night determines length of the photoperiod and when it coincides with the internal clock or oscillator it triggers flowering by producing a florigen hormone in the leaves. ▲

7. Differences between Oestrous Cycle and Menstrual

Cycle: -

See Lahore Board Answer No: 12

8. Hormones Stimulating Mammary Glands for Lactation: -

1. Estrogen
2. Progesterone
3. Prolactin
4. Leutotrophic hormone (LTH)
5. Placental lactogen

9. Role of Interstitial Cells in Sperm Production: -

Interstitial cells secrete testosterone which is essential

for sperm production.

10. A) Parthenogenesis: -

Parthenogenesis is a form of asexual reproduction in which an unfertilized egg develops into an adult animal.

Or

Parthenogenesis is defined as the development of an egg without fertilization.

B) Parthenogenesis different from Apomixis: -

Parthenogenesis	Apomixis
<ol style="list-style-type: none"> 1. In parthenogenesis female gametes (eggs) are produced which develop into adults without fertilization. 2. Eggs produced without fertilization are usually haploid, in some cases diploid eggs are also produced. 3. Adults are usually haploid while diploid adults are also produced. 	<ol style="list-style-type: none"> 1. In apomixis, no gamete is produced, instead a cell in the ovule gives rise to the embryo without fertilization and the rest of the ovule matures into the seed and ovary into fruit. 2. Embryo of seed always develops (without fertilization) from diploid cell of ovule. 3. Adults produced by the germination of seeds produced as a result of apomixis are always diploid.

11. Seed Dormancy and Essential for Plants: -

Seed Lahore Board Answer No: 29

12. Diploid Parthenogenesis with an Example: -

See Lahore Board Answer No: 17

13. Lactation: -

1. Production and release of milk from the breast is called lactation.
2. Prolactin produced by anterior pituitary stimulates milk production.
3. During pregnancy both LTH (produced by anterior pituitary) and lactogen (secreted by placenta) stimulate

mammary development in preparation for lactation.

Or

Lactation is the production of milk by the cells of the

alveoli of breast for nourishing the young. It is caused

by the hormone prolactin. Elevated levels of

placental

estrogen and progesterone during pregnancy

promote

development of the ducts and alveoli in the

mammary

glands but inhibit milk production by suppressing

prolactin. After delivery, suckling of baby triggers

the

release of oxytocin and prolactin. Oxytocin causes

milk ejection while prolactin stimulates the secretion of more milk to replace the milk ejected as the baby nurses. At least four other hormones are essential for their permissive role in ongoing milk production: cortisol, insulin, parathyroid hormone, and growth hormone.

14. Differences between Tissue Culture and Cloning:

Tissue Culture	Cloning
1. It is a form of cloning in which whole organism is produced artificially from a single cell or tissue.	1. It is the production of duplicate copies of DNA, cell or entire multicellular organism, all derived from a common ancestor.
2. It is more prevalent in plants.	2. DNA, bacteria, plants and animals are being successfully cloned.

15. Menopause: -

See Lahore Board Answer No: 15 (A)

DERA GHAZI KHAN BOARD QUESTIONS

- What are castrated males? (D.G.K.Board 2009-A)
- Name two day neutral plants. (D.G.K.Board 2009-A)
- What is placenta? (D.G.K.Board 2009-A)
- Define Vernilization. (D.G.K.Board 2010-A)
- Define Climactic. (D.G.K.Board 2010-A)
- What is Oestous cycle? (D.G.K.Board 2010-A)
- What is seed dormancy? (D.G.K.Board 2011-A)
- Define menopause. (D.G.K.Board 2011-A)
- Give two examples of short day plants. (D.G.K.Board 2011-A)
- Define seed dormancy. Give its importance. (D.G.K.Board Group-I-2012-A)
- Define vernalisation. Give its importance. (D.G.K.Board Group-I-2012-A)
- Differentiate btween short day plants and long day plants with examples. (D.G.K.Board Group-I-2012-A)
- Which types of events occur during after birth? (D.G.K.Board Group-II-2012-A)
- Describe alternation of generation briefly. (D.G.K.Board Group-II-2012-A)
- What are test tube babies? (D.G.K.Board Group-I-2013-A)
- Differentiate between Oviparous and Viviparous animals. (D.G.K.Board Group-I-2013-A)
- Write down causes and and symptoms of Gonorrhea.

- (D.G.K.Board Group-I-2013-A)
- What is Genetal Herpes? (D.G.K.Board Group-II-2013-A)
 - Define Ovulation. (D.G.K.Board Group-II-2013-A)
 - What are Viviparous Animals? (D.G.K.Board Group-II-2013-A)
 - What is Seed Dormancy? (D.G.K.Board-New Course-Group-I-2014-A)
 - What is Vernalization? (D.G.K.Board-New Course-Group-I-2014-A)
 - Define haploid parthenogenesis. (D.G.K.Board-New Course-Group-I-2014-A)
 - Differentiate between Menstrual and Oestrous cycle. (D.G.K.Board-New Course-Group-II-2014-A)
 - Briefly describe the term Menopause. (D.G.K.Board-New Course-Group-II-2014-A)
 - What is Leutinizing Hormone? Write its role. (D.G.K.Board-New Course-Group-I-2014-A)
 - How external fertilization differs from internal fertilization? (D.G.K.Board-New Course-Group-I-2015-A)
 - Give two advantages of cloning. (D.G.K.Board-New Course-Group-I-2015-A)
 - Write a brief note on tissue culture. (D.G.K.Board-New Course-Group-I-2015-A)
 - Define Climacteric. (D.G.K.Board-New Course-Group-II-2015-A)
 - Define Apomixis. (D.G.K.Board-New Course-Group-II-2015-A)
 - Differentiate between Lactation and Gestation. (D.G.K.Board-New Course-Group-II-2015-A)

Answers

1. Castrated Males: -

Castrated males are the males whose testes have been removed in order to prevent reproduction.

2. Names of Two Day Neutral Plants: -

- Maize
- Cotton Or Tomato
- Garden pea

3. Placenta: -

Placenta is a tissue of exchange between maternal blood which consists the portion of the chorion of the

embryo that develops villi, together with underlaying uterine tissue that contains maternal capillaries and small pools of maternal blood. Or In mammals, placenta is a tissue formed in part from the inner lining of the uterus and in part from other membranes, through which the embryo (later fetus) is

nourished (while in uterus) and through which wastes are carried away.

4. Vernalization: -

See Lahore Board Answer No: 13

5. Climacteric: -

See Lahore Board Answer No: 10

6. Oestrous Cycle: -

See Lahore Board Answer No: 24

7. Seed Dormancy: -

See Multan Board Answer No: 10

8. Menopause: -

See Lahore Board Answer No: 15 (A)

9. Two Examples of Short Day Plants: -

1. Tobacco
2. Strawberry

10. Seed Dormancy and Its Importance: -

See Lahore Board Answer No: 29

11. A) Vernalization: -

See Lahore Board Answer No: 13

B) Importance of Vernalisation: -

See Bahawalpur Board Answer No: 11

12. Differences between Short Day Plants and Long Day Plants: -

See Gujranwala Board Answer No: 16

13. Types of Events occurring during After Birth: -

1. Uterus continues to contract to a smaller and smaller size.
2. Placenta separates from implantation site and passes out through vagina.
3. Placental sinuses open causing bleeding.
4. Smooth muscle fibers surrounding uterine blood vessels contract to continue bleeding.

14. Alternation of Generation: -

1. It is the phenomenon of many plants in which haploid gametohyte and diploid sporophyte generation regularly alternate with each other.
2. Plants have diplohaplontic life cycle with alternating diploid sporophyte and haploid gametophyte generation.
3. If two generations are vegetatively similar, such alternation of generation is referred to as isomorphic, and if they are dissimilar it is called heteromorphic.
4. In bryophytes, gametophyte generation is dominant while sporophyte generation is dependent on gametophyte generation.
5. In tracheophytes, sporophyte generation is dominant while gametophyte generation is reduced.

15. Test Tube Babies: -

See Lahore Board Answer No: 3

16. Differences between Oviparous and Viviparous: -

See Lahore Board Answer No: 22

17. A) Causes of Gonorrhea: -

1. It is caused by a gram positive bacterium *Neisseria gonorrhoeae*.
2. Oral/genital contact can cause infection of mouth, throat and tonsils.
3. If by chance person touches infected genitals and touches his or her eyes, a severe infection of eye can result.

B) Symptoms of Gonorrhea: -

1. Initial symptoms include redness and swelling at infection site.
2. Urethral discharge in young males is the most common presenting symptom in gonorrhea.
3. Urethral stricture, epididymitis, pelvis infection and ectopic pregnancy are common.
4. High rates of infertility upto 30 % are common.

18. Genital Herpes: -

See Gujranwala Board Answer No: 1

19. Ovulation: -

See Multan Board Answer No: 8

20. Viviparous Animals: -

See Multan Board Answer No: 30 (B)

21. Seed Dormancy: -

See Multan Board Answer No: 10

22. Vernalization: -

See Lahore Board Answer No: 13

23. Haploid Parthenogenesis: -

See Faisalabad Board Answer No: 15

24. Differences between Menstrual and Oestrous cycle:

See Lahore Board Answer No: 12

25. Menopause: -

See Lahore Board Answer No: 15 (A)

26. A) Leutinizing Hormone: -

1. LH is small glycoproteins having molecular weights of about 30,000.
2. It is released by anterior pituitary under the influence of elevated level of estrogen and decrease of FSH.

B) Role of Leutinizing Hormone: -

1. LH works with FSH to stimulate estrogen secretion and rupture of follicles to release egg or ovum (ovulation).
2. It also causes leutininisation (lit. "turning yellow") of the corpus luteum.
3. It acts synergistically with prolactin to maintain corpus luteum.
4. It acts on corpus luteum to secrete progesterone.

Or

1. It induces ovulation (release of ovum from the follicle).
2. It is responsible for leutininization (that is, the formation of a hormone-secreting corpus luteum in the ovary following ovulation).
3. LH also regulates the ovarian secretion of the female sex hormones, estrogen and progesterone.
4. In males LH stimulates the interstitial cells of Leydig in the testes to secrete the male sex hormone, testosterone, giving rise to its alternative name of interstitial cell-stimulating hormone (ICSH).

27. External Fertilization Different from Internal Fertilization: -

See Faisalabad Board Answer No: 8

28. Two Advantages of Cloning: -

1. Cloning forms exact replica of parent, hence all the offspring behave similarly.
2. It is used to form better crops, selected livestock, etc.

29. Brief Note on Tissue Culture: -

1. In tissue culturing technique, cambium tissue excised from plants can be stimulated by addition of nutrients, cytokinins, and IAA. These cells show continued growth and differentiate into a new plant, genetically identical to their parents.
2. Similar techniques have been developed for tissue culture of animal cells.
3. Tissue culture in plants is now widely used for the rapid propagation of desired varieties or for varieties difficult to propagate by cuttings.

30. Climacteric: -

See Lahore Board Answer No: 10

31. Apomixis: -

See Lahore Board Answer No: 27

32. Differences Between Lactation and Gestation: -

See Lahore Board Answer No: 8

SAHIWAL BOARD QUESTIONS

1. Differentiate between parthenocarp and parthenogenesis. (Sahiwal Board 2013-A)
2. Differentiate between Identical and Fraternal twins. (Sahiwal Board 2013-A)
3. Define cloning. Describe briefly, cloning technique in vertebrates. (Sahiwal Board 2013-A)
4. Compare the asexual and sexual reproduction. (Sahiwal Board (Old Scheme) 2014-A)
5. What changes occur in Ovulation and Menstruation during pregnancy? (Sahiwal Board (Old Scheme) 2014-A)
6. Define reproduction. What is its significance? (Sahiwal Board (New Scheme) 2014-A)
7. Differentiate between oviparous and viviparous. (Sahiwal Board (New Scheme) 2014-A)
8. What is genital herpes? (Sahiwal Board (New Scheme) 2014-A)
9. What is meant by seed dormancy? (Sahiwal Board-New Scheme-2015-A)
10. Give the functions of Sertoli cells. (Sahiwal Board-New Scheme-2015-A)
11. What do you know about the term oviparity?

(Sahiwal Board-New Scheme-2015-

A)

Answers**1. Differences between Parthenocarp and Parthenogenesis: -**

Parthenocarp	Parthenogenesis
1. It is the development of fruit without fertilization. Seed and its embryo (the products of fertilization) are not formed.	1. Diploid or haploid eggs are developed into individuals without fertilization.
2. It occurs in plants.	2. It occurs in animals.

2. Differences between Identical and Fraternal Twins: -

See Lahore Board Answer No: 6

3. Cloning and Cloning Technique in Vertebrates: -

See Multan Board Answer No: 27

4. Comparison of the Asexual and Sexual Reproduction: -

Asexual Reproduction	Sexual Reproduction
1. Only one parent is required.	1. Mostly two parents are required.
2. It involves formation of offspring without the fusion of gametes (i.e. no fertilization).	2. It involves the union of male and female gametes (fertilization occurs). Gametes are usually haploid and their union usually leads to diploid offspring.
3. Meiosis is absent.	3. Meiosis is present at some stage in life cycle to prevent chromosome doubling in every generation.
4. Offsprings are genetically identical to the single parent.	4. Offspring genetically differ from their parents.
5. The parental genotype is preserved in sexual reproduction.	5. Parental genotypes are not preserved in the offspring of sexual reproduction.
6. It produces more offspring.	6. It produces less number of offsprings.
7. It is usually rapid.	7. It is usually slow.

Or

Asexual Reproduction	Sexual Reproduction
1. One parent is involved.	1. Two parents are involved.
2. No fertilization occurs.	2. Fertilization occurs.
3. Meiosis is absent.	3. Meiosis is present at any stage.
4. More offsprings are produced.	4. Less offsprings are produced.
5. Offsprings are genetically identical.	5. Offsprings are genetically different.

5. Changes in Ovulation and Menstruation during Pregnancy: -

See Exercise Chapter No: 18 Answer No: 1

6. A) Reproduction: -

The process by which the organisms produce offsprings of their own kind is called reproduction.

B) Significance of Reproduction: -

Reproduction is the most fundamental function of living thing. It is essential for continuity and survival of the species.

7. Differences between Oviparous and Viviparous: -
See Lahore Board Answer No: 2**8. Genital Herpes: -**

See Gujranwala Board Answer No: 1

9. Seed Dormancy: -

See Multan Board Answer No: 10

10. Functions of Sertoli Cells: -

See Faisalabad Board Answer No: 13

11. Oviparity: -

- Oviparity refers to a type of reproduction in which the eggs are developed after leaving the body of the mother.
- Eggs are usually surrounded by shell to protect the developing embryo from harsh terrestrial environment.
- Fertilization is external in some and internal in others.
- Development of young takes place outside the mother body in the laid eggs.
- During development young obtain nourishment from the egg yolk.
- Oviparity is found in some bony fish, most reptiles, some cartilaginous fish, some amphibians, a few mammals, and all birds.

C h a p t e r ----

19

GROWTH AND DEVELOPMENT

2 SQs

I) From Exercise:-**Questions**

- What is organizer and inducer substance?
- What is differentiation?
- Define embryonic induction.
- Differentiate between growth and development.
- What is meristem?

Answers**1. A) Organizer: -**

- An embryonic tissue that influences upon the other embryonic tissue is known as Organizer or Primary Organizer.
- Organizer is a tissue which corresponds to the presumptive areas of notochord, somites and prechordal plates.
- Organizer is among the first tissue (cells) from dorsal lip of blastopore to migrate during gastrulation.
- Organizer is capable of organizing a whole

embryonic body around it.

- Organizer influences the surrounding cells by means of some specific chemicals known as inducer substances.

B) Inducer Substance: -

- Inducer substance is a chemical stimulus which an organizer transmits and by means of which organizer influences other tissue.
- Inducer substances actually enter the reactant cells and eventually affect their genome. As a result, some specific genes are turned on so that some specific types of proteins are synthesized. These special proteins then give that group of reactant cells some special characteristics. By virtue of these special characteristics, these cells become different from the other cells and are called differentiated.

2. Differentiation: -

- It is a developmental process by which relatively unspecialized cell undergoes a progressive change to a more specialized form or function.
- A fertilized egg contains cytoplasmic components that are unequally distributed within the egg. These different cytoplasmic components are believed to have morphogenetic determinants that control functioning of a specific cell type. This is now called Differentiation. Or
- Differentiation is a process by which phenotypically similar cells specialise to take on different functions.
- In most cells, this process of differentiation is irreversible.
- Embryonic Induction: -**
 - The phenomenon in which an embryonic tissue influences upon the other embryonic tissue through transmitting some chemical stimulus is called as Embryonic Induction. Or
It is the process by which one group of cells (organizer) induces another group of cells to differentiate.
 - This phenomenon is important for differentiation in animals during embryonic development.

4. Differences between Growth and Development: -

Growth	Development
1. Growth is an increase in the size of an organism.	1. Development is a programmed series of stages from simple to complex form.
2. It involves cell division and cell enlargement.	2. It involves all progressive changes that take place in the life of an organism

5. Meristem: -

- Meristems are young tissues or group of cells that retain the potential to divide.
- Meristems are certain regions or growing points in higher plants which are capable of division.
- The entire plant body, in higher plants, is not capable of

growing but growth is limited to these growing points or meristems.

4. The dividing cells of meristem are called meristematic cells. Or

1. Meristem is a specific area called growing point in higher vascular plants which is composed of cells whose primary function is the formation of new cells by mitotic division.

2. The cells of meristem which divide rapidly by mitosis are known as meristematic cells.

3. Dividing meristematic cells are typically young, small, with a dense cytoplasm, small or no vacuole and a large, active nucleus.

4. Each meristematic cell divides by mitosis and produces two daughter cells, one of which remains meristem and one differentiates into as a part of mature body of the plant.

5. These meristematic cells are located at the tips of stem and root. These are also present in the form of cylinders in the vascular bundles or between them and beneath the epidermis.

5. The plant has the ability to grow its entire life because it possesses meristematic tissue.

(II) From Punjab Boards:- **LAHORE BOARD QUESTIONS**

- How primitive streak is formed in chick embryo? (Lahore Board 2008-
A)
- What is organizer and inducer substance? (Lahore Board 2009-
A)
- What is the difference between inhibitory effect and compensatory effect? (Lahore Board 2009-
A)
- How does light influence the growth of plants? (Lahore Board 2009-
A)
- Differentiate between growth and development. (Lahore Board 2010-
A)
- What is the present goal of gerontology? (Lahore Board 2010-
A)
- What is open growth? Discuss. (Lahore Board 2011-
A)
- Define regeneration. (Lahore Board 2011-
A)
- Differentiate between somatic and planchic mesoderm. (Lahore Board Group-I-2012-
A)
- State role of grey vegetal and grey equatorial cytoplasm. (Lahore Board Group-I-2012-
A)

- What do you mean by open growth? (Lahore Board Group-II-2012-
A)
- State de differentiation of cells. (Lahore Board Group-II-2012-
A)
- What is primary organizer and inducer substances? (Lahore Board Group-I-2013-
A)
- Define gastrulation in chick. (Lahore Board Group-I-2013-
A)
- Define meristem, name its types on the basis of position. (Lahore Board Group-I-2013-
A)
- What is Aging? Explain this process. (Lahore Board Group-I-2013-
A)
- What is gastrocoele and from which germ layer it is originated? (Lahore Board Group-II-2013-
A)
- How do final size of cells of cortex and tracheids is attained in zone of maturation. (Lahore Board Group-II-2013-
A)
- Give the names of two sheet like layers in to which mesoderm splits and name of the cavity formed between these. (Lahore Board Group-II-2013-
A)
- What are the symptoms of aging? (Lahore Board Group-I-(Session-2012-
14) (2014-
A)
- What are the important signs of old age in human beings? (Lahore Board Group-II-(Session-2012-
14) (2014-
A)

Answers

- How Primitive Streak is Formed: -**
When presumptive mesodermal cells of blastoderm in gastrulation, migrate medially and caudally from both sides, they form a mid line thickening called primitive streak in chick embryo, which grows rapidly in length as more and more presumptive mesodermal cells continue to aggregate in the middle. Or
The cells of epiblast of blastoderm in gastrulation, migrate toward the midline and form a thickened region called primitive streak which elongates and narrows as it develops and contains a narrow furrow called primitive groove at its center and a Hensen's node at its cephalic end.
- Organizer and Inducer Substance: -**
See Exercise Chapter No: 19 Answer No: 1
- Differences between Inhibitory Effect and Compensatory Effect: -**

Inhibitory Effect	Compensatory Effect
1. In inhibitory effect,	1. In compensatory

growth of lateral (buds) shoots is inhibited. 2. It occurs due to the release of auxin from the apical bud which reaches to lateral bud by diffusion.	effect, growth of lateral buds is released from apical dominance. 2. It occurs due to removal of apex or applying of cytokinin on lateral buds.
--	--

4. Influence of Light on the Growth of Plants: -
Light affects of the rate of growth in three ways.

a. Intensity of Light: -

Increase in the intensity of light increases the number of cell division.

b. Quality of Light: -

1. Red light favors elongation of cells.
2. Blue light enhances cell division but retards cell enlargement.
3. Ultraviolet rays retard cell elongation.

c. Duration of Light (Photoperiod): -

It affects the growth of vegetative and reproductive structures. Photoperiodism is a phenomenon in which light duration induces or suppresses flowering.

5. Differences between Growth and Development: -
See Exercise Chapter No: 19 Answer No: 4

6. Present Goal of Gerontology: -

Present goal of gerontology is not necessarily to increase life span but to increase health span.

7. Open Growth: -

Open growth pattern of plant means the plant, throughout its life, adds new organs such as branches, leaves.

8. Regeneration: -

1. The ability to regain or recover the lost or injured part of the body is called regeneration. Or Regeneration is a process of replacement, repair or restoration of lost or damaged structures or reconstruction of a whole body from a small fragment of an organism during the post embryonic life.

2. The ability or capacity to regenerate is found in all animals to some extent. In some any structure lost is regenerated while in others it is limited to some structure.

3. If lobster loses its pincer claw, a new claw regenerates.

4. If starfish breaks off portions of their arms into pieces till the central disc is left, central disc in almost all cases and also the arms in some cases are capable of developing into separate individuals.

9. Differences between Somatic and Splanchnic Mesoderm: -

Somatic Mesoderm	Splanchnic Mesoderm
1. It is an outer layer.	1. It is an inner layer.
2. It is also known as parietal layer.	2. It is also known as visceral layer.
3. It lies next to the ectoderm.	3. It is in contact with the endoderm.

10. A) Role of Gray Vegetal Cytoplasm: -

It gives rise to gut.

B) Role of Grey Equatorial Cytoplasm: -
It produces notochord and neural tube.

11. Open Growth: -

See Lahore Board Answer No: 7

12. De differentiation of Cells: -

1. De differentiation of cells means cells become less specialized.
2. De differentiation occurs in the cells of amputated limb

of salamander and newts during the process of regeneration of amputated limb.

13. Organizer and Inducer Substance: -

See Exercise Chapter No: 19 Answer No: 1

14. Gastrulation in Chick: -

1. Gastrulation is characterized by the movement and rearrangement of cells in the embryo.
2. Following events take place during gastrulation in chick:

- a. The blastoderm splits into two layers: an upper layer of cells called epiblast (presumptive ectoderm and mesoderm) and a lower layer of cells called hypoblast

(presumptive endoderm).

- b. Hypoblast cells form endodermal lining of a yolk sac.

- c. Central cells of blastoderm (called are pellucida) are separated from yolk while the peripheral cells of blastoderm (called area opaca) lie unsparated from the yolk.

- d. Primitive streak is formed when the cells of epiblast migrate medially and caudally from both sides

which gradually elongates.

- e. A depression known as Hensen's node is formed at the anterior margin of the primitive streak.

- f. Three germ layers ectoderm, mesoderm and endoderm are formed.

15. A) Meristem: -

Meristems are young tissues or group of cells that retain the potential to divide.

B) Names of Types of Meristem on the Basis of Position: -

1. Apical Meristem--- Located at the tip of stem and root.
2. Intercalary Meristem---Located at the base of internode and have become separated from the apex by permanent tissue.
3. Laterla Meristem---Located between vascular bundle and beneath the epiderm.

16. A) Aging: -

Aging is negative physiological changes in the body of humans.

B) Process of Aging: -

Following points are note worthy in the process of aging:

- a. Cells of tissues have a limited potential of division.
- b. Changes in intracellular substances take place.
- c. Spontaneous mutation may result in loss of cells and

- degeneration of cells.
17. **A) Gastrocoele: -**
It is the cavity between the yolk and the endoderm.
- B) From Which Germ Layer Gastrocoele Originate: -**
It originates from endoderm.
18. **Attaining the Final Size of Cells of Cortex and Tracheids: -**
- Cortex cells do not elongate further to attain the final size.
 - Cells of tracheids elongate lengthwise more than in other direction to attain the final size.
19. **A) Names of Two Sheet like Layers in to which Mesoderm Splits: -**
- Somatic or Parietal Layer
 - Splanchnic or visceral Layer
- B) Name of the Cavity formed between Layers: -**
Coelom
20. **Symptoms of Aging: -**
- Loss of hair pigment
 - Development of small pigmented areas in the skin of face and arms
 - Dryness and wrinkling of skin
 - Loss of agility
 - Increased weight due to fat
 - Poor vision
 - General weakness
 - Gradual loss of memory (forgetfulness)
 - Decreased body immunity
 - Development of degenerative diseases such as arthritis, osteoporosis, arteriosclerosis etc.
 - Blood clotting in the coronary artery
21. **Important Signs of Old Age in Human Beings: -**
See Lahore Board Answer No: 20

GUJRANWALA BOARD QUESTIONS

- Explain embryonic development.
(Gujranwala Board-2008-
A)
- Explain primary induction?
(Gujranwala Board-2008-
A)
- What is secondary growth?
(Gujranwala Board-2009-
A)
- Describe regeneration in planaria.
(Gujranwala Board-2009-
A)
- Define correlation and differentiation.
(Gujranwala Board-2010-
A)
- How area opaca differs from area pellucid?
(Gujranwala Board-2010-
A)
- How aging can be slow down?
(Gujranwala Board-2010-
A)
- List some symptoms of aging.
(Gujranwala Board-2011-
A)
- Differentiate between primary growth and secondary

- growth in plants. (Gujranwala Board-2011-
A)
- What is growth? Mention its types.
(Gujranwala Board-2012-
A)
 - Differentiate between area pellucida and area opaca.
(Gujranwala Board-2012-
A)
 - Define regeneration with examples.
(Gujranwala Board-2013-
A)
 - Differentiate between growth and development.
(Gujranwala Board-2013-
A)
 - Define teratology. What are teratogens?
(Gujranwala Board-2013-
A)
 - Define growth correlations.
(Gujranwala Board-New Scheme-2014-
A)
 - Differentiate between growth and development.
(Gujranwala Board-New Scheme-2015-
A)
 - What is discoidal cleavage?
(Gujranwala Board-New Scheme-2015-
A)

Answers

1. Embryonic Development: -

- The progressive changes which are undergone before an organism acquires its adult form constitute embryonic development. Or It is a series of stages by which a zygote becomes an organism.
 - It occurs in the embryonic stage of an organism.
2. **Primary Induction: -**
Only cells from the dorsal lip of blastopore were capable of inducing development of complete embryo. Spemann designated these cells the primary organizer and the process as Primary Induction. Or
- Induction (influence of one embryonic tissue upon the other embryonic tissue) between three tissue types—ectoderms, mesoderm and endoderm—is referred to as primary induction.
 - The differentiation of the central nervous system during neurulation by the interaction of dorsal ectoderm and dorsal mesoderm to form neural tube is an example of primary induction.

3. Secondary Growth: -

- An increase in plant girth due to vascular cambium and cork cambium is called Secondary Growth. Or Secondary growth is the thickness of the plant due to the activity of lateral meristems.
- Vascular and cork cambium both produce sheets of new cells laterally, thus adding girth.
- For the most part, only gymnosperms and woody dicots have secondary growth.

4. Tissues produced by secondary growth comprise the wood and bark.

4. Regeneration in Planaria: -

During regeneration in Planaria, neoblasts (unspecialized cells, always present in the body of adult) are mobilized and migrate to the site of amputation where they differentiate into specialized cell types.

5. A) Correlation: -

1. The development of a plant is usually correlated with its growth and different organs growing at different rates in different directions and development of different parts takes place. Such reciprocal relationship is known as Correlations or Growth Correlations. Or

The growth of a plant organ is related with the growth of other organs which takes place in different directions, this reciprocal relationship is known as Correlations.

2. One of the most important correlative effect in plants is apical dominance, in which when apical bud grows, it suppresses the growth in lower axillary (lateral) buds.

B) Differentiation: -

See Exercise Chapter No: 19 Answer No: 2

6. Area Opaca Different from Area Pellucida: -

Area Opaca	Area Pellucida
1. It is an area of marginal or peripheral cells of blastoderm.	1. It is an area of central cells of blastoderm.
2. This area lies unseparated from the yolk and forms the zone of junction.	2. It is an area which has been separated from yolk.
3. No pool of fluid develops in this area.	3. A pool of fluid develops under this area.
4. It is a transparent area that transmits light.	4. It is a translucent area.

7. How Aging Be Slowed Down: -

1. Aging can be slowed down by better nutrition and improved living conditions e.g. regular meals, regular exercise, adequate sleep, abstinence from smoking and maintaining ideal weight. Or
Low-fat diet, aerobic, low impact exercises may likely to reduce some effects of aging.

8. Some Symptoms of Aging: -

See Lahore Board Answer No: 20

9. Differences between Primary Growth and Secondary Growth in Plants: -

Primary Growth	Secondary Growth
1. It is an increase in the length of a plant.	1. It is an increase in girth (thickness) of a plant.
2. It occurs due to the activity of apical meristems located at the tips of roots and shoots	2. It occurs due to activity of lateral meristem i.e. vascular cambium and cork cambium located in

and also within the buds of stems.

3. It occurs in all plants.

the form of cylinders throughout the length of older stems and roots.
3. Only gymnosperms and woody dicots have secondary growth.

10. A) Growth: -

Growth is defined as a permanent irreversible increase in size, weight, shape and structure usually accompanied by a permanent change of form.

B) Types of Growth: -

a. Primary Growth: -

1. It is the increase in stem and root length of the plant.
2. It occurs due to the activity of apical meristems.
3. All plants exhibit primary growth, which produces entire plant body in herbaceous plants and the young,

soft shoots and roots in woody trees and shrubs.

b. Secondary Growth: -

1. It is an increase in the girth or thickness of a plant.
2. It occurs due to the activity of lateral meristems i.e. the vascular cambium and cork cambium.

11. Differences between Area Pellucida and Area Opaca: -

See Gujranwala Board Answer No: 6

12. A) Regeneration: -

It is the ability of living organisms to reconstruct its lost parts of the body.

B) Examples: -

1. Sponges have great power of regeneration. Sponges not only replace the parts lost but any piece of the body is capable of growing into a complete sponge.
2. In plants, regeneration is the basis of plant propagation. When a part of stem with a few leaves are taken from many kinds of plants and are planted in the soil, they form a complete plant.

3. Healing of fracture and repair of wounds are examples of regeneration in humans.

13. Differences Between Growth and Development: -

See Exercise Chapter No: 19 Answer No: 4

14. A) Teratology: -

Teratology is the branch of biology, which deals with

the abnormal developments and causes for such development. Or

Study of deviations and its causes in the normal structure and functions of an organism occurring under unfavorable conditions during

embryological development is called Teratology.

B) Teratogens: -

Any thing which interferes with normal process of development is called Teratogen. Or

Any agent capable of interfering with normal morphogenesis in an embryo leading to abnormal development is called Teratogen. Or
Environmental factors causing or contributing to abnormal development are grouped together as teratogens.

Examples include radiation, certain chemicals, certain infectious agents, lethal mutations etc.

15. Growth Correlations: -

See Gujranala Board Answer No: 5

16. Differences Between Growth and Development: -

See Exercise Chapter No: 19 Answer No: 4

17. Discoidal Cleavage: -

See Bahawalpur Board Answer No: 2

MULTAN BOARD QUESTIONS

1. What are the causes of abnormal development? (Multan Board-2008-A)
2. Define coelom. How is it formed? (Multan Board-2008-A)
3. What do you know about teratogens? (Multan Board-2008-A)
4. What is Apical Meristem? (Multan Board-2008-S)
5. What is Embryonic Induction? (Multan Board-2008-S)
6. How temperature influences the rate of growth in plants? (Multan Board-2008-S)
7. What are apical and lateral meristems? (Multan Board-2009-A)
8. What is Gray Crescent? (Multan Board-2009-A)
9. Differentiate between Area Pellucida and Area Opeca. (Multan Board-2009-A)
10. What is Growth Correlation? (Multan Board-2009-S)
11. Define regeneration with examples. (Multan Board-2009-S)
12. Define Gray Crescent and write its role in development. (Multan Board-2009-S)
13. Define Gastrulation. (Multan Board-2010-A)
14. Compare lateral meristem with intercalary meristem. (Multan Board-2010-S)
15. What is the effect of temperature on growth? (Multan Board-2010-S)
16. How Coelom is formed? (Multan Board-2011-A)
17. Explain Embryonic Induction? (Multan Board-2011-A)
18. Give the effect of temperature on plant growth. (Multan Board-2011-S)
19. What is gray crescent? Give its importance. (Multan Board-2011-S)

20. Differentiate Between Area Opaca and Area Pellucida. (Multan Board-2012-A)
21. How does temperature influence on Plant Growth? (Multan Board-2012-A)
22. What are Neoblast and their role? (Multan Board-2012-S)
23. How do quality and quantity of light affect plant growth? (Multan Board-2012-S)
24. What is Blastoderm? (Multan Board-2013-A)
25. Give the role of Cytoplasm in the development of an Ascidian. (Multan Board-2013-A)
26. What are Apical Meristems? (Multan Board-2013-A)
27. Define Aging. Write its two signs. (Multan Board-2013-A)
28. What is Embryonic Induction? (Multan Board-Old Scheme-2014-A)
29. Differentiate between Primary and Secondary Growth. (Multan Board-Old Scheme-2014-A)
30. What is Apical Dominance? (Multan Board-New Scheme-2014-A)
31. Define Gerontology. (Multan Board-New Scheme-2015-A)
32. What is Blastoderm? (Multan Board-New Scheme-2015-A)

Answers

1. Causes of Abnormal Development: -

1. Inheritance of defective gene (s) from parents to offspring is the most important cause of abnormal development. Abnormal development is also related to the presence of defective gene on sex chromosomes, or whether gene is dominant or recessive, homozygous or heterozygous.
 2. Presence of missing or extra chromosome in the zygote leads to abnormal development of an individual.
 3. Ionization radiations (e.g. x-rays), absence of certain nutrient (e.g. vitamins and trace elements), toxins and even drugs during pregnancy lead to abnormal development in the foetus.
- 2. A) Coelom: -**
1. Coelom is a fluid filled space developed entirely within the mesoderm between the body wall and digestive tube.
 2. It is surrounded by a layer of epithelial cells entirely

- derived from mesoderm.
- It is formed either by splitting of mesoderm or by an evagination of the embryonic gut or archenteron.

B) How Coelom is Formed: -

About 24 hours of incubation of chick embryo, lateral plate of mesoderm splits in the middle to form two layers known as parietal or somatic mesoderm

towards

the outside and a visceral or splanchnic mesoderm towards the inside. The space enclosed by these two layers of mesoderm is the coelom.

3. Teratogens: -

- Environmental factors causing or contributing to abnormal development are grouped together as teratogens.
- Ionization radiations (e.g. x-rays) affecting developing ovum or spermatozoan causing damage or changes in the gene (mutation) are well known for their teratogenic actions.
- Nutritional deficiencies, absence of certain substances (vitamins, trace elements) toxins, drugs even ingested by mother, effect the differentiation of every tissue in the foetus causing abnormal development.

4. Apical Meristem: -

- It is a specialized region of cells at the growing tip of shoot or root.
- It is primarily concerned with the extension of plant body (i.e. primary growth).
- It produces new cells behind it and continually adds length to a shoot or root (axial growth).
- It is also responsible for the production of lateral appendages such as leaves and floral parts.

Or

- An apical meristem is an area of dividing tissue, located at the tip of shoot or root that gives rise to primary tissues.
- Apical meristem causes an increase the length of the plant body.

5. Embryonic Induction: -

See Exercise Chapter No: 19 Answer No: 3

6. Influence of Temperature on the Rate of Growth in

Plants: -

- Normally rate of growth in plants increases with the increases in temperature and decreases with decrease in temperature.
- Rate of growth is maximum at optimum temperature of 50-30 °C and is minimum (least) at 5-10 °C.
- At very high temperature (35-40 °C) the rate of growth stops and plant may die due to excessive transpiration or loss of enzyme.

7. A) Apical Meristem: -

See Multan Board Answer No: 4

B) Lateral Meristem: -

- It is a cylinder of dividing cells present throughout the length of older stems and roots in vascular bundle or

between them except tips. It is also present beneath the epidermis.

- It is present in dicots and gymnosperm.
- It causes an increase in the thickness (girth) of plant body called secondary growth.
- Vascular and cork cambium are the examples of lateral meristem.

8. Gray Crescent: -

- Gray crescent is the pigment free area that appears at the time of fertilization.
- In gray crescent area, cytoplasm contains information essential for development. Or
- After fertilization just opposite to the point of entrance of sperm nucleus in the ovum, some of the pigments of cytoplasm shift upward leaving behind a grey area in the form of crescent called gray crescent.
- Cytoplasm containing gray crescent is required for the normal development.

9. Differences between Area Pellucida and Area Opeca: -

See Gujranwala Board Answer No: 6

10. Growth Correlation: -

See Gujranwala Board Answer No: 5

11. Regeneration with Examples: -

See Gujranwala Board Answer No: 12

12. A) Gray Crescent: -

Gray crescent is the grayish area of cytoplasm that marks the region where gastrulation begins in an amphibian embryo.

B) Role of Gray Crescent in Development: -

Gray crescent region is thought to contain growth factors and other developmental determinants and is required for the normal development of an amphibian.

13. Gastrulation: -

- Gastrulation is characterized by the movement and rearrangement of cells in the embryo.
- It is the embryological process that results the formation of gastrula.
- It eventually results in the formation of the embryonic gut (endoderm), ectoderm and mesoderm.

14. Comparison of Lateral Meristem with Intercalary Meristem: -

Lateral Meristem	Intercalary Meristem
<ol style="list-style-type: none"> It is a cylinder of dividing cells present throughout the length of older stems and roots except tips. It is present in dicots and gymnosperm. It causes an increase in the thickness (girth) of plant body. 	<ol style="list-style-type: none"> It is a part of apical meristem which gets separated from apex by permanent tissue. It is present in all plants. It causes the production of leaves and flowers.

15. The Effect of Temperature on Growth: -

See Multan Board Answer No: 6

16. How Coelom is Formed: -

See Multan Board Answer No: 2 (B)

17. Embryonic Induction: -

See Exercise Chapter No: 19 Answer No: 3

18. The Effect of Temperature on Plant Growth: -

See Multan Board Answer No: 6

19. A) Gray Crescent: -

1. It is a dark, arching band that forms on the surface of

the amphibian zygote opposite the point of sperm penetration

2. It is formed in the region where gastrulation will occur.

B) Importance of Gray Crescent: -

Gray crescent region is thought to contain growth factors and other developmental determinants and is required for the normal development of an amphibian.

20. Differences between Area Opaca and Area Pellucida: -

See Gujranwala Board Answer No: 6

21. Influence of Temperature on Plant Growth: -

See Multan Board Answer No: 6

22. A) Neoblasts: -

Neoblasts are a large number of undifferentiated cells

present in flatworms (e.g. Planaria) which can proliferate and develop into any kind of tissue

when animal requires to do so.

B) Role of Neoblasts: -

During regeneration they are mobilized and migrate to the site of amputation, where they differentiate into

specialized cell types.

23. A) Quality of Light Affecting Plant Growth: -

1. Red light favors elongation of cells.

2. Blue light enhances cell division but retards cell enlargement.

3. Ultraviolet rays retard cell elongation.

B) Quantity of Light Affecting Plant Growth: -

1. Increase in the quantity of light increases the number

of cell division.

2. Quantity of light also favors or depresses flowering.

24. Blastoderm: -

It is a small disc of cells at the animal end of a reptile

or bird embryo that results from early cleavages.

25. Role of Cytoplasm in the Development of an Ascidian: -

1. Different morphological determinants are present in different cytoplasmic components of different blastomeres.

2. The fertilized egg of an ascidian contains cytoplasm of

five different colors that is segregated into different blastomeres.

a. Clear cytoplasm --- It produces larval epidermis.

b. Yellow cytoplasm --- It gives rise to muscle cells.

c. Gray vegetal cytoplasm --- It gives rise to gut.

d. Grey equatorial cytoplasm --- It produces notochord and neural tube.

26. Apical Meristems: -

See Multan Board Answer No: 4

27. A) Aging: -

It can be defined as negative physiological changes in

our body. Or

It is the process of progressive deterioration in the body of multicellular animals.

B) Two Signs of Aging: -

1. Loss of hair pigment

2. Development of small pigmented areas in the skin of face and arms Or

1. Dryness and wrinkling of skin

2. Loss of agility Or

1. Increased fat deposition

2. Increased susceptibility to diseases

28. Embryonic Induction: -

See Exercise Chapter No: 19 Answer No: 3

29. Differences between Primary Growth and Secondary Growth: -

See Gujranwala Board Answer No: 9

30. Apical Dominance: -

1. Apical dominance is the inhibition of lateral buds by shoot tip.

2. Auxin produced by shoot apex plays an important role

in apical dominance.

31. Gerontology: -

1. It is the branch of biology which deals with the study

of aging.

2. Its main goal is to increase health span of human beings instead of increasing their life span.

32. Blastoderm: -

It is the discoidal cap of cells above the blastocoel.

BAHAWALPUR BOARD QUESTIONS

1. How red light and blue light affect growth?

(Bahawalpur Board-2008-

A)

2. What do you mean by discoidal cleavage?

(Bahawalpur Board-2008-

A)

3. What is Hensons's node and Grey crescent?

(Bahawalpur Board-2008-

A)

4. How is Coelom formed? (Bahawalpur Board-2009-

A)

5. Explain Discoidal Cleavage.

(Bahawalpur Board-2009-

A)

6. Differentiate between Apical and Lateral Meristem.

(Bahawalpur Board-2009-

A)

7. What is Apical Dominance?

(Bahawalpur Board-2010-

A)

8. Differentiate Area Pellucida from Area Opaca.

(Bahawalpur Board-2010-

A)

9. What is Open Growth? Explain.

- (Bahawalpur Board-2011-
A)
10. Differentiate between epiblast and hypoblast.
(Bahawalpur Board-2011-
A)
11. Define Grey Crescent. Give its significance also.
(Bahawalpur Board-2012-
A)
12. Explain the process of Discoidal Cleavage.
(Bahawalpur Board-2013-
A)
13. What is Grey Crescent? Give its role.
(Bahawalpur Board-2013-
A)
14. Define Teratogens. Mention their examples and role.
(Bahawalpur Board-2013-
A)
15. Differentiate between Teratology and Teratogen.
(Bahawalpur Board-New Scheme-
2014)
16. What is Apical Dominance?
(Bahawalpur Board-New Scheme-
2015)
17. Define Apical Meristem and Intercalary Meristem.
(Bahawalpur Board-New Scheme-
2015)

Answers

1. **A) Effect of Red Light on Growth: -**
It favors enlargement of cells.
B) Effect of Blue Light on Growth: -
It favors cell division but retards cell enlargement.
2. **Discoidal Cleavage: -**
In bird's egg the process of cell division is confined to the small disc of protoplasm laying on the surface of the yolk at the animal pole. This type of cleavage is referred to as discoidal cleavage. Or The cleavage in birds is restricted to the blastodisc laying on the top of the yolk towards the animal pole of the zygote, this type of cleavage is termed as discoidal cleavage.
3. **A) Hensen's Node: -**
1. It is a local thickening at the cephalic or anterior end of the primitive streak.
2. It consists of closely packed cells.
3. It marks the site of a somewhat special type of invagination.
4. Cells destined to form the notochord concentrate in Hensen's node.
5. It is formed by cells of presumptive notochord and floor of neural tube.
B) Gray crescent: -
Gray crescent is the grayish area of cytoplasm that marks the region where gastrulation begins in an amphibian embryo.
4. **How Coelom is Formed: -**
1. Coelom is formed either by splitting of mesoderm or by an evagination of the embryonic gut or archenteron.
2. In chick embryo, coelom is formed when lateral plate mesoderm is splitted into two sheet like layers viz

somatic mesoderm and splanchnic mesoderm with a space between them. The cavity formed between somatic mesoderm and the splanchnic mesoderm is coelom.

5. Discoidal Cleavage: -

1. It is restricted to the blastodisc, a cap like yolk free cytoplasm at the top of the yolk.
2. It is incomplete cleavage which does not divide the yolk of the ovum.
3. It, however, divides the blastodisc completely.
4. The first two cleavage planes are vertical while the third runs horizontally parallel to the surface. The successive cleavages become irregular and number of cells increase.

6. Differences between Apical and Lateral Meristem:

Apical Meristem	Lateral Meristem
1. It is an area of dividing tissue that gives rise to primary tissue.	1. It is an area of cell division that gives rise to secondary tissues.
2. It is located at tip of the shoot or root.	2. It extends along the entire length of the stem and root except at the tip and includes vascular cambium and cork cambium.
3. It causes an increase in the length of the plant body.	3. It causes an increase in the girth of the plant body.

7. Apical Dominance: -

See Multan Board Answer No: 30

8. Differences Area Pellucida from Area Opeca: -

See Gujranwala Board Answer No: 6

9. Open Growth: -

See Lahore Board Answer No: 7

10. Differences between Epiblast and Hypoblast: -

Epiblast	Hypoblast
1. It is upper layer cells of blastoderm in blastula.	1. It is the lower layer of cells of blastoderm in blastula.
2. It is mainly presumptive ectoderm and mesoderm.	2. It is mainly presumptive endoderm.

11. Gray Crescent and its Significance: -

See Multan Board Answer No: 19

12. The Process of Discoidal Cleavage: -

1. The cleavage furrows starts in the clear cytoplasm region (blastodisc) at the top of the yolk
2. The first two cleavages occur at right angle to each other in vertical plane one after the other.
3. The third cleavage occurs in horizontal plane parallel to the surface and thus cuts underneath the cytoplasm and separates it from the yolk. As a result of third cleavage eight blastomeres are formed.
4. The rest of cleavages are irregular as a result of which blastodisc becomes several layers thick, and a fluid filled subgerminal space develops beneath it.

13. Gray Crescent and its Role: -

See Multan Board Answer No: 19

14. A) Teratogens: -

Environmental factors causing or contributing to

normal development are grouped together as teratogens.

B) Examples of Teratogens: -

Examples include radiation, certain chemicals, certain infectious agents, lethal mutations etc.

C) Role of Teratogens: -

1. Some teratogens (e.g. x-rays) effect on developing ovum or spermmetazoan causing damage or changes (mutations) in the genes.
2. Some teratogens (e.g. drugs, toxins etc.) effect the differentiation of every tissue in the fetus.

15. Differences between Teratology and Teratogen: -

Teratology	Teratogen
It is the branch of biology which deals with abnormal developments and causes for such developments.	It causes abnormal development.

16. Apical Dominance: -

See Multan Board Answer No: 30

17. A) Apical Meristem: -

See Multan Board Answer No: 4

B) Intercalary Meristem: -

See Faisalabad Board Answer No: 12

FAISALABAD BOARD QUESTIONS

1. Write a note on vitamins in plants growth. (Faisalabad Board-2008-

A)

2. Write Intercalary meristems and their functions. (Faisalabad Board-2008-

A)

3. What is the role of Cytokinins in apical dominance? (Faisalabad Board-2009-

A)

4. Define Gastrulation. (Faisalabad Board-2009-

A)

5. Differentiate between apical and intercalary meristems. (Faisalabad Board-2010-

A)

6. What are metabolic defects? (Faisalabad Board-2010-

A)

7. What is embryonic induction? (Faisalabad Board-2011-

A)

8. Differentiate between teratology and genontology. (Faisalabad Board-2011-

A)

9. Define teratology and tertogenes. (Faisalabad Board-2012-

A)

10. Define teratology. (F.B- 2013) (Faisalabad Board-2013-

A)

11. What is primitive streak? (Faisalabad Board-2013-

A)

12. What are intercalary meristems? (Faisalabad Board-2013-

A)

13. Define growth correlations

(Faisalabad Board-New Scheme-2014-

A)

14. Define apical dominance.

(Faisalabad Board-Old Scheme-2014-

A)

15. What do you know discoidal cleavage?

(Faisalabad Board-Old Scheme-2014-

A)

16. Differentiate between neurula and neurocoel.

(Faisalabad Board-New Scheme-2015-

A)

17. Write two layers of lateral plate of mesoderms.

(Faisalabad Board-New Scheme-2015-

A)

Answers

1. A Note on Vitamins in Plant Growth:

Vitamins are organic compounds synthesized within plant bodies in the presence of light. If the plants are grown in dark, the vitamin deficiencies are induced and growth of the plant ceases.

2. A) Intercalary Meristems: -

1. These are the parts of apical meristem which get separated from apex by permanent tissues.
2. They are situated at the bases of internodes in many plants.
3. They are of temporary nature.

B) Functions of Intercalary Meristems: -

1. They play important role in the production of leaves.
2. They also play an important role in the production of flower.

3. Role of Cytokinins in Apical Dominance: -

If cytokinins are applied directly on the inhibited lateral buds, it allows lateral buds to be released from apical dominance.

4. Gastrulation: -

See Multan Board Answer No: 13

5. Differences between Apical and Lateral Meristems:

See Bahawalpur Board Answer No: 6

6. Metabolic Defects: -

1. Metabolic defects are the defects caused by biochemical abnormalities during embryological development.
2. Metabolic defects lead to deviations from normal.
3. During organogenesis, when various body organs are formed, sometimes, one organ or its parts is missing or it is repeated and it can result into abnormal organs or body parts and individuals born are malformed.

7. Embryonic Induction: -

See Exercise Chapter No: 19 Answer No: 3

8. Differences between Teratology and Teratogen: -

See Bahawalpur Board Answer No: 15

9. A) Teratology: -

It is the branch of biology which deals with abnormal development and causes for such development.

B) Tertogens: -

Environmental factors causing or contributing to

abnormal development are grouped together as teratogens.

Examples include radiation, certain chemicals, certain infectious agents, lethal mutations etc.

10. Teratology: -

See Faisalabad Board Answer No: 9(A)

11. Primitive Streak: -

- In the early embryos of birds, reptiles and mammals, primitive streak is a dorsal, longitudinal strip of ectoderm and mesoderm that is equivalent to the blastopore in other forms. Or
It is a dynamic, constantly changing structure that forms at the midline of blastodisc in birds, mammals and some other vertebrates.
- Initially primitive streak is formed as mid line thickening as cells of epiblast (presumptive mesoderm) migrate medially and caudally.
- It grows rapidly in length as more and more presumptive mesodermal cells continue to aggregate in the middle.
- At the centre of primitive streak, is a narrow furrow or groove along the whole length of the streak and is known as primitive groove marked on either side by a thickened margin the primitive ridges.
- The anterior end of the primitive streak is Hensen's node or primitive node occupied by notochordal cells while rest of the cells are mesodermal cells.

12. Intercalary Meristems: -

- These are parts of the apical meristems which have become separated from the apex by permanent tissues and left behind as the apical meristem moves on during growth.
- They occur at the base of nodes in many grasses, below the node in some mints and at the base of the leaf in many plants.
- They are of temporary nature.

13. Growth Correlations: -

See Gujranwala Board Answer No: 5

14. Apical Dominance: -

See Multan Board Answer No: 30

15. Discoidal Cleavage: -

See Bahawalpur Board Answer No: 5

16. Differences between Neurula and Neurocoel: -

Neurula	Neurocoel
It is the embryo with neural tube.	It is the cavity enclosed in central nervous system.

17. Two Layers of Lateral Plate of Mesoderms: -

Two layers of lateral plate of mesoderm are:

a. Somatic or Parietal Mesoderm: -

It is the outer layer which lies next to the ectoderm.

b. Splanchnic or Visceral Mesoderm: -

It is the inner layer which is in contact with endoderm.

RAWALPINDI BOARD QUESTIONS

- What are teratogen and teratology?
(Rawalpindi Board-2010-
A)

- What is Cleavage? (Rawalpindi Board-2011-
A)
- What is Morula? (Rawalpindi Board-2012-
A)
- How does mesoderm form from coelom in developing embryo? (Rawalpindi Board-2012-
A)
- What is growth correlation? (Rawalpindi Board-2013-
A)
- Give some symptoms of aging? (Rawalpindi Board-2013-
A)
- Define meristem. Name its types based on position. (Rawalpindi Board-2013-
A)
- Define the terms Gastrocoel and Neurocoel. (Rawalpindi Board-New Pattern-2014-
A)
- Differentiate between apical and lateral meristem. (Rawalpindi Board-New Pattern-2015-
A)

Answers

1. Teratogen and Teratology: -

See Faisalabad Board Answer No: 9

2. Cleavage: -

It is a series of mitotic cell divisions which the egg undergoes immediately after fertilization. Or
It is a rapid series of successive cell divisions of a fertilized egg. Or
It is a series of mitotic cell divisions without growth

in

the zygote.

- In cleavage, zygote undergoes a series of rapid mitotic divisions with no period growth during each cell cycle.
- Cleavage increases only the number of cells. It does not change the original volume of the egg cytoplasm, hence cells get smaller with each cell division.
- In cleavage different daughter cells receive different regions of ovum's cytoplasm and hence, different regulatory signals.

3. Morula: -

- It is an early embryo consisting of solid ball of cells. Or

It is a solid of cells in early stage of embryonic development.

- It is a rounded closely packed mass of cells.
 - It is usually a 32 celled embryo.
 - Cells of the morula are called blastomeres.
 - In chick embryo, it consists of a disc shaped mass of cells two or more layers in thickness (blastoderm) laying close to the yolk. In the centre of the blastoderm, the cells are smaller and completely defined while those at periphery, are flattened and larger.
 - It continues to divide forming a blastula.
- #### 4. Formation of Coelom From Mesoderm: -
- See Multan Board Answer No: 2 (B)
- #### 5. Growth Correlation: -
- See Gujranwala Board Answer No: 5

6. Some Symptoms of Aging: -

1. Loss of hair pigment
2. Development of small pigmented areas in the skin of face and arms
3. Dryness and wrinkling of skin
4. Loss of agility
5. Increased fat deposition

7. Meristem and Names of Types of Meristem**Based****on Position: -**

See Lahore Board Answer No: 14

8. A) Gastrocoel: -

The cavity between yolk and the endoderm is called Gastrocoel.

B) Neurocoel: -

The cavity enclosed in the central nervous system is called Neurocoel.

9. Differences between Apical and Lateral Meristem:-

See Bahawalpur Board Answer No: 6

SARGODHA BOARD QUESTIONS

1. Define apical dominance. Name the hormone which causes apical dominance.

(Sargodha Board-2010-

A)

2. Differentiate between epiblast and hypoblast.

(Sargodha Board-2010-

A)

3. How aging can be slowed down?

(Sargodha Board-2011-

A)

4. What is regeneration? Give one example.

(Sargodha Board-2012-

A)

5. Define embryonic induction.

(Sargodha Board-2012-

A)

6. What is open growth? Explain it briefly in plants.

(Sargodha Board-2013-

A)

7. What is gray crescent? Give its role.

(Sargodha Board-2013-

A)

8. What is regeneration? How does it occur in starfish?

(Sargodha Board-2013-

A)

9. What are intercalary meristems?

(Sargodha Board-New Scheme-2014-

A)

Answers**1. A) Apical Dominance: -**

It is phenomenon in which lower axillary or lateral bud is suppressed during the growth of apical or terminal bud.

B) Hormone causing Apical Dominance:

Auxin is responsible for apical dominance.

2. Differences between Epiblast and Hypoblast: -

See Bahawalpur Board Answer No: 10

3. How Can be Slowed Down: -

See Gujranwala Board Answer No: 7

4. A) Regeneration: -

The ability to regain or recover the lost or injured part

of the body is called Regeneration.

B) Example: -

Lizard can easily discard its tail but tail can be regenerated by special features of its tail.

5. Embryonic Induction: -

See Exercise Chapter No: 9 Answer No: 3

6. Open Growth in Plants: -

See Lahore Board Answer No: 7

7. Gray crescent and its Role: -

See Multan Board Answer No: 12

8. A) Regeneration: -

Regeneration of is a process of replacement, repair

or

restoration of lost or damaged structures or reconstruction of a whole body from a small

fragment

of an organism during the post embryonic life.

B) Regeneration in Starfish: -

If starfish breaks off portions of their arms into

pieces

till the central disc completely devoid of arm is left, central disc in almost all cases and also the arms in some cases are capable of developing into separate individuals. Or

A starfish can regenerate its arms if it is accidentally

or

deliberately removed.

9. Intercalary Meristems: -

See Faisalabad Board Answer No: 12

DERA GHAZI KHAN BOARD**Questions**

1. Differentiate between Epiblast and Hyoblast

(D.G.K. Board-2009-

A)

2. What is the difference between growth and embryonic

development?

(D.G.K. Board-2009-

A)

3. Differentiate between growth and development.

(D.G.K. Board-2010-

A)

4. What is secondary growth?

(D.G.K. Board-2010-

A)

5. What is compensatory effect?

(D.G.K. Board-2011-

A)

6. Characterize hase of differentiation of plant growth.

(D.G.K. Board-2011-

A)

7. Differentiate between growth and development.

(D.G.K. Board-Group-I-2012-

A)

8. Define aging. Write its two signs.

(D.G.K. Board-Group-I-2012-

A)

9. Differentiate between inhibitory and compensatory effect on growth.

(D.G.K. Board-Group-II-2012-

A)

10. Give any four key elements in animal development.

(D.G.K. Board-Group-II-2012-

A)

11. What is gray crescent?

(D.G.K. Board-Group-I-2013-

A)

12. What is the role of cytokinin in apical dominance?
(D.G.K. Board-Group-I-2013-A)
13. Define Aical Dominance.
(D.G.K. Board-Group-II-2013-A)
14. What is regeneration?
(D.G.K. Board-Group-II-2013-A)
15. Differentiate between inhibitory and compensatory effects.
(D.G.K. Board-Group-II-2013-A)
16. Enlist tyes of cytoplasm on the basis of colors in fertilized egg of an Ascidian.
(D.G.K. Board-New Scheme-Group-I-2014-A)
17. What are neoblasts?
(D.G.K. Board-New Scheme-Group-II-2014-A)
18. Enlist the key events in animal's development.
(D.G.K. Board-New Scheme-Group-I-2015-A)
19. Compare epiblast and hypoblast in Gastrulation stage of Development.
(D.G.K. Board-New Scheme-Group-I-2015-A)
20. What are lateral meristems and what is their role?
(D.G.K. Board-New Scheme-Group-II-2015-A)
21. What is apical dominance?
(D.G.K. Board-New Scheme-Group-II-2015-A)

Answers

1. **Differences between Epiblast and Hyoblast:** -
See Bahawalpur Board Answer No: 10
2. **Difference between Growth and Embryonic Development:** -

Growth	Embryonic Development
1. It occurs in embryo as well as adult.	1. It takes place only in the embryo.
2. It increases the size of the embryo and adult.	2. It is a series of stages by which a zygote becomes an organism.

3. **Difference between Growth and Development:** -
See Exercise Chapter No: 19 Answer No: 4
4. **Secondary Growth:** -
See Gujranwala Board Answer No: 3
5. **Compensatory Effect:** -
The removal of apex releases the lateral buds from apical dominance. It is called compensatory effect.
6. **Base of Differentiation of Plant Growth:** -
7. **Difference between Growth and Development:** -
See Exercise Chapter No: 19 Answer No: 4
8. **Aging and its Two Signs:** -
See Multan Board Answer No: 27
9. **Differences between Inhibitory and Compensatory**

Effect on Growth: -

See Lahore Board Answer No: 3

10. Any Four Key Elements in Animal Development:

-
- 1. Gamete formation
- 2. Fertilization
- 3. Cleavage
- 4. Gastrulation

11. Gray Crescent: -

See Mltan Board Answer No: 8

12. Role of Cytokinins in Apical Dominance: -

If cytokinins are applied directly on the lateral inhibited buds, it allows lateral buds to be released from apical dominance.

13. Apical Dominance: -

See Multan Board Answer No: 30

14. Regeneration: -

See Lahore Board Answer No: 8

15. Differences between Inhibitory and Compensatory

Effect on Growth: -

See Lahore Board Answer No: 3

16. Types of Cytoplasm On the basis of Colors in Fertilized Egg of an Ascidian: -

- 1. Clear cytoplasm producing larval epidermis
- 2. Yellow cytoplasm giving rise to muscle cells
- 3. Gray vegetal cytoplasm giving rise to gut
- 4. Grey equatorial cytoplasm producing notochord and neural tube.

17. Neoblasts: -

See Multan Board Answer No: 22

18. List of the Key Events in Animal's Development:

-
- 1. Gamete Formation ---- Sperm and egg formation
- 2. Fertilization ----- Egg and sperm fuse to form zygote
- 3. Cleavage ----- Zygote divides, blastomeres are formed
- 4. Gastrulation ----- Germ layers are formed
- 5. Organogenesis ---- Body organs formed, cells interact and differentiate
- 6. Growth ----- Organs increase in size, adult body form attained

19. Comparison of Epiblast and Hypoblast in Gastrulation Stage of Development: -

See Bahawalpur Board Answer No: 10

20. A) Lateral Meristems: -

- 1. Meristems are cylinders of dividing cells.
- 2. They are present in dicots and gymnosperms.
- 3. Vascular and cork cambium are examples of lateral meristems.
- 4. Some lateral meristems are determinate while others are indeterminate.
- 5. Determinate lateral meristems grow to certain size and then stop, such as leaves, flowers and fruits.
- 6. Indeterminate lateral meristems continually grow and replenish themselves remaining youthful, such as vegetative root and stem.

B) Role of Lateral Meristems: -

They play an important role in the increase of stem

and root.

21. Apical Dominance: -

See Multan Board Answer No: 30

SAHIWAL BOARD QUESTIONS

1. Define embryonic induction. (Sahiwal Board-2013-A)
2. What is differentiation? (Sahiwal Board-2013-A)
3. What is the role of apical dominance in plants? (Sahiwal Board-2013-A)
5. What do you mean by discoidal cleavage? (Sahiwal Board-Old Scheme-2014-A)
6. What are neoblasts? (Sahiwal Board-Old Scheme-2014-A)
7. Define aging. (Sahiwal Board-New scheme-2015-A)
8. What are teratogen? Give one example. (Sahiwal Board-New scheme-2015-A)

Answers

1. Embryonic Induction: -

See Exercise Chapter No: 19 Answer No: 3

2. Differentiation: -

See Exercise Chapter No: 19 Answer No: 2

3. Role of Apical Dominance in Plants: -

1. It plays an important role in tap root development.
2. It inhibits sprouting of lateral buds (eyes) in potatoes by applying synthetic auxin, thereby increasing the storage period of potatoes from one to three years.

4. How Process Aging be Slowed Down: -

See Gujranwala Board Answer No: 7

5. Discoidal Cleavage: -

See Bahawalpur Board Answer No: 5

6. Neoblasts: -

See Multan Board Answer No: 22

7. Aging: -

See Multan Board Answer No: 27 (A)

8. A) Teratogen: -

Environmental factors causing or contributing to abnormal development are grouped together as teratogens.

B) One Example: -

Radiation

C h a p t e r ---

20

CHROMOSOMES AND DNA

3 SQs

I) From Exercise:-

Questions

1. What are the major classes of RNA?
2. What is the function RNA polymerase in

transcription?

3. How did Crick and his colleagues determine how many nucleotides are used to specify each amino acids?
4. What is anticodon?

Answers

1. Classes of RNA: -

a. Messenger RNA (mRNA): -

1. It is a single, uncoiled strand of RNA with exposed bases.
2. It is transcribed from DNA and passes from nucleus to ribosome.
3. During polypeptide synthesis, it brings information from chromosome to ribosome to direct the assembly of amino acids into a polypeptide chain.

b. Transfer RNA (tRNA): -

1. tRNA is relatively a small molecule consisting of 70-90 nucleotides.
2. Like other RNAs it is single stranded, but is folded back on itself in various places by complementary base pairing to form a complex three dimensional shape. When flattened out it resembles a clover leaf.
3. It has a triplet of nucleotides called an anticodon that can establish hydrogen bonds with the codon in mRNA.
4. It also has an amino acid attachment site at its 3' hydroxyl end.
5. tRNA brings the correct amino acid to the codon during protein synthesis.

c. Ribosomal RNA (rRNA): -

1. Ribosomal RNA (rRNA) is the class of RNA found in ribosome.
2. It is in globular form and is an integral part of the structure of ribosomes.
3. During translation, rRNA provides the sites where polypeptides are assembled. Or Three classes of RNA are present.
 1. Messenger RNA---A long single strand of RNA which carries the specific information for making a protein.
 2. Transfer RNA---A three dimensional RNA that bonds with only one amino acid and carries it to the ribosome.
 3. Ribosomal RNA---A globular RNA that is integral part of ribosome which provides the site where polypeptides are assembled.
2. **Function RNA Polymerase in Transcription: -**

It catalyses the assembly of a mRNA molecule, sequence of which is complementary to a DNA molecule used as a template. Or Using DNA as template, RNA polymerase catalyses the linking together of four ribonucleotides to form RNA. It copies the base sequence of one of the

DNA

strands (called coding strand).

3. How did Crick and His Colleagues Determine How

Many Nucleotides are Used to Specify Each**Amino****Acid: -**

Crick and his colleagues tested all 64 condons (each comprising three nucleotides) by making artificial mRNA and triplet codons and using them to synthesize a protein or amino-acyl-tRNA complexes

in cell free systems. Or

1. Initial Watson's experiments demonstrated that words

of genetic code are all three bases long and that a set of three bases means one amino acids.

2. Later Nirenberg, Leader and Khorana used cell free system for protein synthesis, which was an extract of

E.coli that had been broken open and from which cell

wall had been removed. This extract contained the ribosomes, tRNA, aminocayl-tRNA synthetase and others factors required for protein synthesis.

3. They demonstrated, by using cell free extracts, a synthetic mRNA could be translated in vitro.

4. The first RNA which they used was polyuridylic acid

(RNA composed entirely of uracil= UUUUU...) and the result was synthesis of a polypeptide made only

of phenylalanine. Thus it was deduced that the codon for

phenylalanine was coded exclusively by uridine bases

(UUU).

4. In this way they tested all 64 codons, each proved to contain three nucleotides.

4. Anticodon: -

It is the three nucleotide sequence in the tRNA molecule, that is complementary to three bases of amino acid specifying codon in messenger RNA.

Or

It is the sequence of three unpaired bases at one point

on tRNA which is complementary to a codon on

mRNA

and can combine with it by complementary base pairing.

II) From Punjab Boards:-**LAHORE BOARD QUESTIONS**

1. Define transformation and write its role.

(Lahore Board-2008-

A)

2. What is semi-conservative replication?

(Lahore Board-2008-

A)

3. What is semi-conservative replication model of DNA.

(Lahore Board-2009-

A)

4. Describe briefly about sickle cell anemia.

(Lahore Board-2009-

A)

5. What are Okazaki fragments? (Lahore Board-2009-

A)

6. Define transcription and how it is initiated.

(Lahore Board-2010-

A)

7. Define chromosomal theory of inheritance.

(Lahore Board-2010-

A)

8. Differentiate between chromosomal aberrations and point mutation.

(Lahore Board-2010-

A)

9. What is transformation?

(Lahore Board-2011-

A)

10. Enlist different shapes of chromosomes.

(Lahore Board- Group-I-2012-

A)

11. Enlist non-sense codons and their function.

(Lahore Board- Group-I-2012-

A)

12. Define nucleosomes.

(Lahore Board- Group-II-2012-

A)

13. What are the constituents of purines?

(Lahore Board- Group-II-2012-

A)

14. Give the length of okazaki fragments.

(Lahore Board- Group-II-2012-

A)

15. What is phosphodiester linkage? Draw structural

formula. (Lahore Board- Group-I-2013-

A)

16. Differentiate between chromosomal aberration and point mutation.

(Lahore Board- Group-I-2013-

A)

17. What is Alkaptonuria and its cause?

(Lahore Board- Group-II-2013-

A)

18. Give the role and kinds of tRNA.

(Lahore Board- Group-II-2013-

A)

19. What is translation?

Lahore Board(Session 2012-14)- Group-

I)

(2014-

A)

20. Define point mutation.

Lahore Board(Session 2012-14)- Group-

I)

(2014-

A)

21. Define karyotype.

Lahore Board(Session 2012-14)- Group-

I)

(2014-

A)

22. What is genetic code?

Lahore Board(Session 2012-14)- Group-

II)

(2014-

A)

23. What is function of RNA polymerase in transcription?

Lahore Board(Session 2012-14)- Group-

II)

- (2014-
A)
24. Compare euchromatin with heterochromatin.
(Lahore Board (Session 2012-14)
(Group-II-2014-

Answers

1. A) Transformation: -

1. Transformation is the transfer of genetic material from one cell to another and can alter the genetic make up of the recipient cell.

B) Role of Transformation: -

- Due to this process, the genetic change in bacteria can

be brought about by uptake of DNA from the environment. Role of transformation was first observed by Griffith in 1928 when DNA of heat killed

S-type bacteria changed the live DNA of R-type bacteria into live S-type bacteria in his last experiment.

2. Semi-Conservative Replication: -

1. It is the replication of DNA in which each daughter helix consists of one old and one new strand.
2. Watson and Crick suggested in 1953, that during DNA

replication, each strand of DNA acts as a template for the synthesis of a complementary strand. In this way,

DNA replication produces two daughter DNA duplexes, each of which contains one parental strand and one newly synthesized strand. This mode of replication is termed semi-conservative replication.

3. Semi-Conservative Replication Model of DNA: -

1. In semi-conservative replication model of DNA, the sequence of original duplex is conserved, the duplex itself not. Instead each strand of the duplex becomes part of another duplex.
2. In semi-conservative replication, the two strands of the duplex separate out each acting as a model, along which new nucleotides are arranged thus giving rise to new duplexes.

3. In this process by separation of two strands, primary structure has been conserved

4. Sickle Cell Anemia: -

1. It is an inherited form of anemia in which there is abnormality in the hemoglobin beta chains.
2. In sickle cell anemia, defective hemoglobin molecules cause red blood cells to distort when subjected to low oxygen concentration, reducing its ability to carry oxygen.
3. Sickle cell hemoglobin molecule differs from normal hemoglobin by only one amino acid. It contains glutamic acid instead of valine.
4. The critical change in the sickle cell disease is a

mutation that replaces a single thymine with an adenine at the position that codes for glutamic acid converting the position to valine.

5. The normal DNA contains CTT triplet that specifies glutamic acid, while the DNA of sickle cell hemoglobin contains CAT which specifies valine.

5. Okazaki Fragments: -

1. These are short fragments of DNA produced by discontinuous replication, elongating in the 5'→3' direction away from the replication fork.
2. Each Okazaki fragment is synthesized by DNA polymerase III in 5'→3' direction, beginning at the replication fork and moving away from it.
3. Each okazaki fragment begins with a RNA primer.
4. Many okazaki fragments are joined by DNA ligase to

form lagging strand.

5. Okazaki fragments are 200 nucleotides in eukaryotes and 1000-2000 in prokaryotes.

6. A) Transcription: -

The enzymatic synthesis of RNA molecules complementary to a strand of DNA is called Transcription. Or

It is the synthesis of an RNA molecule whose sequence is complementary to the sequence of one strand of a segment of DNA. Or

Transcription is a process by which an RNA

molecule

is polymerized on a DNA template with the aid of various enzymes.

B) How Transcription is Initiated: -

Transcription is catalyzed by a RNA polymerase, a holoenzyme with five subunits. Transcription starts at

the RNA polymerase binding site called promoter

site

on the DNA template strand. The binding of RNA polymerase to the promoter is the first step in gene transcription. One of the subunits of RNA

polymerase,

sigma factor is responsible for correct initiation of transcription process. Once the transcription has started, the sigma factor is released and the

remaining

part of the enzyme (core enzyme) moves on the template strand and completes the transcription of

the

gene.

7. Chromosomal Theory of Inheritance:

The chromosomal theory of inheritance postulated

as

follows:

1. Reproduction involves initial union of two cells, egg and sperm. If Mendel's model is correct, then these two gametes must make equal hereditary contributions. Sperm, however, contain little cytoplasm, therefore, the hereditary material must reside within the nuclei of the gametes.
2. Chromosomes segregate during meiosis in a manner similar to that exhibited by the elements of Mendel's model.
3. Gametes have only one copy of each pair of

homologous chromosomes; diploid individuals have two copies. In Mendel's model gametes have copy of each element; diploid individuals have two copies. During meiosis, each pair of homologous chromosomes orient on the metaphase independent of any other pair. Thus independent assortment of chromosomes is a process suggestive of the independent assortment of factors postulated by Mendel.

8. Differences between Chromosomal Aberrations and Point Mutation: -

Chromosomal Aberrations	Point Mutations
<ol style="list-style-type: none"> 1. Chromosomal aberrations are megachanges in the chromosomes. 2. Chromosomal aberrations are concerned with the visible changes in the structure of the chromosome. 3. They involve presence of an extra chromosome or loss of a chromosome from the diploid number of chromosomes, or changes like deletion, insertions, inversions etc in the parts of the chromosome. 	<ol style="list-style-type: none"> 1. Point mutations are microchanges which occur in molecular structure of DNA. 2. They are invisible and may be observable by cytological techniques. 3. They involve alterations in one or few base pairs in the coding sequence such as deletion, insertion, substitution in one or few bases of chromosome.

9. Transformation: -

The term transformation is used in following related meanings.

1. It is the process of transmitting genetic information from one bacterium to another bacterium through environment causing it to transform (undergo changes). This principle was first notified by Fred Griffith in 1928.
2. It is the conversion of normal cultured cells into cancerous cells. It is usually produced by certain viruses that can cause the cancerous transformation of normal cells in cultures.
3. It is the process of introducing a recombinant DNA molecule (insert DNA and vector together) into a compatible host cell. This method is applied in biotechnology.

10. Different Shapes of Chromosomes: -

The usual shapes of chromosomes are i, j and v.

11. A) List of Non-Sense Codons: -

UAA, UAG, UGA and AUG

B) Functions of Non-Sense Codons: -

1. AUG signals start --that is, the beginning of a protein (start codon).
2. UAA, UAG and UGA signal stop--the end of a protein (stop codon).

12. Nucleosomes: -

1. Every 200 nucleotides, DNA duplex is coiled around a

core of eight histone proteins forming a complex known as a nucleosome. Or

1. Nucleosomes are fundamental units of eukaryotic chromosome.
2. Each nucleosome is a complex of DNA and histone proteins in which the double helical DNA winds around eight molecules of histone.
3. Chromatin is composed of long sequences of nucleosomes. Or
1. Nucleosomes are the subunits of chromatin.
2. One nucleosome is composed of core of histone octamer complexed with 146 base pairs of DNA.
3. In a nucleosome, histones are positively charged while the phosphate groups of DNA are negatively charged.
4. Adjacent nucleosomes are connected by linker DNA associated with another histone protein.

13. Constituents of Purines: -

Purines contain two bases Adenine and Guanine.

Both

these bases consist of two fused rings containing nitrogen, hydrogen and carbon atoms.

14. The Length of Okazaki Fragments: -

1. In eukaryotes, Okazaki fragments are about 100-200 nucleotides long.
2. In prokaryotes, Okazaki fragments are 1000-2000 nucleotides long.

15. A) Phosphodiester Linkage: -

Phosphodiester is a linkage which binds two nucleotides of nucleic acid. In this linkage,

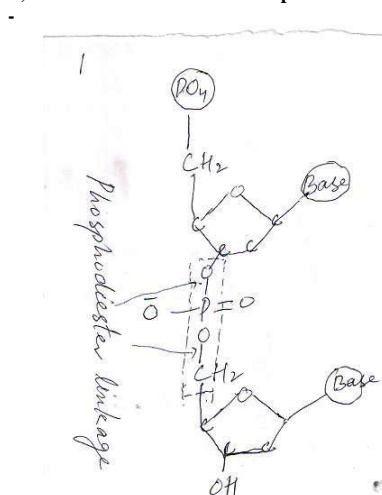
phosphate

group is linked to the two sugars by means of a pair

of

ester (P-O-C).

B) Structural Formula of Phosphodiester Linkage: -



16. Differences between Chromosomal Aberration and Point Mutation: -

See Lahore Board Answer No: 8

17. A) Alkaptonuria: -

1. It is also known as black urine disease.
2. It is a condition in which the urine contains homogentisic acid, which turns black on exposure to air.

B) Cause of Alkaptonuria: -

It is a hereditary disease which is caused by a recessive allele. In this disease an enzyme necessary for breakdown (catabolism) of homogentisic acid is lacking.

18. Role of tRNA: -

tRNA molecules transport both the amino acids to the ribosomes for use in the building the polypeptides and also position each amino acid at the correct place on the elongating polypeptide chain.

B) Kinds of tRNA: -

Human cells contain about 45 different kinds of tRNA molecules.

19. Translation: -

1. The process of mRNA directed polypeptide synthesis by ribosomes is called translation.
2. In this process nucleotide-sequence information in mRNA is translated into amino acid-sequence information in polypeptide chain. Or
1. It is a process by which a protein is synthesized from amino acids according to the nucleotide sequence of an mRNA molecule.
2. In addition to mRNA, two major components, ribosomes and tRNA are involved in translation.

Or

Translation is an enzymatic process that requires ribosomes binding to and moving along mRNA to read the nucleotide sequence and convert it into a sequence of amino acids in a polypeptide chain.

20. Point Mutation: -

1. Change in the single or few bases of the DNA molecule is called point mutation.
2. Mutational changes that effect the message itself, producing alterations in the sequence are called point mutations, since they usually involve only one or a few nucleotide.
3. It is also known as gene mutation.
4. Mutations may arise for two reasons:
 - a. Some are spontaneous, meaning that they arise without any apparent external cause, usually due to pairing errors occurring during DNA replication.
 - b. Most are induced by external agents called mutagens. There are three classes of mutagen: radiation, chemicals, and viruses

21. Karyotype: -

1. The particular array of chromosomes that an individual possesses is called its karyotype which may differ greatly between different species, or sometimes

even between particular individuals.

2. Karyotypes of individuals are often examined to detect genetic abnormalities, such as those arising from extra or lost chromosomes. Or
The term karyotype is given to whole group of characteristics that allows the particular chromosomal set, that is, the number of chromosomes, relative size, position of centromere, length of the arms, secondary constriction and the satellites.
2. The karyotype is characteristic of an individual, species, genus, or larger grouping, and may be represented by a diagram in which the pairs of homologous chromosomes are ordered in a series of decreasing size.

22. Genetic Code: -

1. Genetic code is the combination of three nucleotides which specify a particular amino acid.
2. Genetic code has several features:
 - a. Each codon corresponds to only one amino acid. For example the triplet GAC represents or stands for the amino acid glutamic acid GUG represents valine.
 - b. There are several codons for most amino acids. For example, there are six codons for serine, four for glycine and two for lysine.
 - c. Three codons act as stop signals, meaning end of message.
 - d. One codon acts both as start and code for the amino acid methionine.
 - e. The genetic code is universal. It is the same in almost all the organisms. But the study of code of mitochondrial DNA however, showed that genetic code is not that universal. Or
1. Genetic code is the relationship between base sequence in DNA (or in some viruses, RNA) and amino acid in proteins.
2. It is a triplet code, meaning that three bases specify each amino acids.
3. It is written in the 5'—3' direction.
4. The term codon can refer to triplets of either mRNA or of DNA.

23. Function of RNA Polymerase in Transcription: -

RNA polymerase recognizes and binds to specific site on one of the strand of DNA molecule and assembles a single strand of RNA with a nucleotide sequence complementary to that of the DNA strand it has bound.

24. Comparison of Euchromatin with

Heterochromatin: -

Euchromatin	Heterochromatin
1. Euchromatin is condensed during cell division and is present in an open configuration at all other times	1. The regions of heterochromatin remain tightly coiled and bound to chromosome proteins throughout the cell cycle

2. It is generally capable of transcription, hence its genes can be expressed.	even during interphase.
3. It is loosely packed chromatin structure.	2. It is not available for transcription, hence its genes are never expressed.
4. It is lightly staining.	3. It is highly coiled and condensed chromatin.
	4. It is densely staining.

GUJRANWALA BOARD QUESTIONS

- Why histones are positively charged?
(Gujranwala Board-2009-
A)
- What is phosphodiester bond?
(Gujranwala Board-2009-
A)
- What is RNA primer? What role does it play?
(Gujranwala Board-2009-
A)
- How do histones and DNA interact with each other in chromosomes?
(Gujranwala Board-2010-
A)
- What are mutagens? Give an example.
(Gujranwala Board-2010-
A)
- Differentiate between translation and transcription.
(Gujranwala Board-2011-
A)
- Compare telocentric and acrocentric chromosomes.
(Gujranwala Board-2011-
A)
- Define transformation.
(Gujranwala Board-2011-
A)
- Mention the types of chromosomes due to centromeric position.
(Gujranwala Board-2012-
A)
- Why is Erwin Chargaff famous for?
(Gujranwala Board-2012-
A)
- What is transcription bubble? How it is formed.
(Gujranwala Board-2012-
A)
- What is heterochromatin and euchromatin.
(Gujranwala Board-2013-
A)
- What are okazaki fragments? Also give their lengths.
(Gujranwala Board-2013-
A)
- Differentiate between purines and pyrimidine.
(Gujranwala Board-2013-
A)
- What is point mutations? Give examples.
(Gujranwala Board-New Scheme-2014-
A)
- What is sickle cell anemia?
(Gujranwala Board-New Scheme-2014-
A)
- What is genetic code? Quote one example.
(Gujranwala Board-New Scheme-2015-
A)
- Differentiate between chromosome and nucleosome.

(Gujranwala Board-New Scheme-2015-

- A)
19. Differentiate between translation and transcription.
(Gujranwala Board-New Scheme-2015-
A)

Answers**1. Why Histone are Positively Charged: -**

Histones are positively charged due to an abundance of the basic amino acids arginine and lysine.

2. Phosphodiester: -

- It is a covalent linkage between two nucleotides in a strand of DNA or RNA.
- It includes a phosphate group bonded to the sugars of two adjacent nucleotides by two ester (P-O-C) bonds,
one between phosphate group and 5' OH of sugar of same nucleotide and the second between phosphate group and 3' OH of sugar of another nucleotide.

3. A) RNA Primer: -

- In DNA replication, RNA primer is a sequence of about 10 RNA nucleotides complementary to unwound DNA that attaches at a replication fork.

Or

RNA primer is the sequence of about 10 RNA nucleotides synthesized by RNA primase during replication, complementary to initial unwound template DNA strand.

- The RNA primer is later degraded and replaced by DNA nucleotides.
- Only one RNA primer is required for the construction of whole leading strand but one RNA primer for each Okazaki fragment in the construction of lagging strand.

B) Role of RNA Primer: -

RNA primer provides a 3' OH end to which DNA polymerase adds nucleotides to form the new strand.

Or

It pairs with the template strand of DNA and provides a starting point (free 3'OH end) for DNA polymerase to begin synthesis of the new DNA chain.

4. Interaction of Histones and DNA in Chromosomes:

Histones are positively charged due to arginine and lysine while DNA are negatively charged due to negatively charged phosphate groups in it. Histones are strongly attracted to the phosphate groups of the DNA. Thus histones act as magnetic forms that promote and guide the coiling of DNA.

5. A) Mutagens: -

- Mutagens are environmental agents causing mutations.

Or

Any agent capable of entering in the cell and producing mutations is called mutagen. Or

An agent that induces changes in the DNA (mutations) is called mutagen.

- Since cancer is a result of somatic mutations,

mutagens are also carcinogenic (cancer-producing agents).

3. There are three classes of mutagen: Radiation, Chemical and Viruses.

B) An Example of Mutagen: -

Nitrous acid (a chemical mutagen) changes cytosine into uracil, which pair with adenine rather than guanine. The end result is to convert a C—G pair into an A—T pair.

6. Difference between Translation and Transcription:

Translation	Transcription
1. It takes place in the cytoplasm of eukaryotic cell.	1. It takes place in the nucleus of the cell.
2. It is the second step of gene expression (central dogma).	2. It is first step of gene expression (central dogma).
3. Polypeptide chain is synthesized from mRNA.	2. RNA is synthesized from DNA.
4. Amino acids, mRNA, ribosomes, tRNA, initiation and elongated factors are required for translation.	3. Ribonucleoside triphosphates, DNA and an enzyme RNA polymerase are required for transcription.
5. Start codon is required for the initiation of translation.	3. Promotor site is required for the initiation of transcription.
6. Stop codon and releasing factor terminate the translation.	4. GC hairpin causes RNA polymerase to stop transcription.

7. Comparison of Telocentric and Acrocentric Chromosomes: -

Telocentric Chromosome	Acrocentric Chromosome
1. The centromere is located at the terminal position or at one end.	1. The centromere is present very near to the end.
2. The arms of chromatids are present toward one side only.	2. One side has very short arms of chromatids while other side has very long arms.

8. Transformation: -

The term transformation is used in following related meanings:

1. It is the process of transmitting genetic information from one bacterium to another bacterium through environment causing it to transform (undergo changes). This principle was first notified by Fred Griffith in 1928.
2. It is the conversion of normal cultured cells into cancerous cells. It is usually produced by certain viruses that can cause the cancerous transformation of normal cells in cultures.
3. It is the process of introducing a recombinant DNA molecule (insert DNA and vector together) into a compatible host cell. This method is applied in biotechnology.

9. Types of Chromosomes due to Centromeric Position: -

1. Telocentric Chromosomes: -

- a. Centromere is located at the terminal position or at one end.
- b. The arms of chromatids are present toward one side only.

2. Acrocentric Chromosomes: -

- a. The centromere is present very near to end.
- b. One side has very short arms of chromatids while other side has very long arms.
- c. They are rod shaped.

3. Submetacentric Chromosomes: -

- a. The centromere is slightly displaced from the centre.
- b. Both sides have arms of unequal length of chromatids.

4. Metacentric Chromosomes: -

- a. Centromere is present almost in the center.
- b. Both sides have equal or almost equal arms.
- c. They are V shaped.

10. Erwin Chargaff Famous For: -

Chargaff observed following underlying regularity in

double stranded DNA:

1. The proportion of A always equals that of T, and proportion of G always equals that of C:
 $A=T$, and $G=C$
2. It follows that there is always an equal proportion of purines (A and G) and pyrimidines (C and T).
 $A+G=T+C$

11. A) Transcription Bubble: -

1. It is an unwound bubble of DNA of 18 base pairs.
2. It is the region containing the RNA polymerase, DNA, and growing RNA transcript.

B) Formation of Transcription Bubble: -

1. The DNA at the initiation site of transcription is denatured by an isomerization reaction in which RNA polymerase and promoter shift from a closed complex to an open complex. In the open complex 18 base pairs of DNA are denatured, forming a transcription bubble.
2. Within the bubble the first 12 bases of newly synthesized RNA temporarily forms RNA-DNA hybrid with the template DNA strand.
3. The transcription bubble moves down the bacterial DNA at a constant about 50 nucleotides per second, leaving the growing strand protruding from the bubble.

12. A) Heterochromatin: -

1. Heterochromatin is defined as those regions of chromosome that remain permanently condensed.
2. It is thought that in heterochromatin the DNA remains tightly packed in the 30 nm fiber.
3. This condensed chromatin is inactive in mRNA synthesis, hence genes contained in heterochromatic segments are never expressed.
4. Heterochromatin corresponds to regions of chromosomes that are packaged in a highly condensed form.

5. A large portion of heterochromatin contains repetitive DNA sequences.

6. Heterochromatin is densely staining.

B) Euchromatin: -

1. Euchromatin is defined as those regions of chromosomes which are usually present in an open configuration and are condensed only during cell division when compact packaging facilitates the movement of chromosomes.
2. Euchromatin is less densely packaged than heterochromatin.
3. It is metabolically active with regard to RNA synthesis, hence its genes can be expressed.
4. Euchromatin is lightly staining.

13. A) Okazaki Fragments: -

Okazaki fragments are short length of DNA formed in the lagging strand during DNA replication.

B) Lengths of Okazaki Fragments: -

See Lahore Board Answer No: 14

14. Differences between Purines and Pyrimidines: -

Purines	Pyrimidines
1. Purines contain a fused five and six membered ring.	1. Pyrimidines contain a six membered ring.
2. They include adenine and guanine.	2. They include cytosine, thymine and uracil.

15. A) Point Mutations: -

1. It is the change in the base sequence of a gene, resulting in a new allele. Or
Any change in the DNA sequence is known as a point (gene) mutation.
2. A point mutation arises when a base is inadvertently substituted, added, or deleted during the replication process.

B) Examples of Point Mutations: -

1. Sickle Cell Anemia: -

In sickle cell anemia, a point mutation leads to the change of amino acid glutamic acid into valine at position 6 from N terminal end in hemoglobin β chain.

This consequently alters the tertiary structure of the hemoglobin molecule reducing its ability to carry oxygen.

2. Phenylketonuria: -

It is a recessive disorder caused by a mutant allele of a

gene encoding the enzyme phenylalanine hydroxylase

that normally breakdown phenylalanine. In this disease

phenylalanine accumulates in the cells leading to mental retardation, as the brain fails to develop in fancy.

16. Sickle Cell Anemia: -

See Lahore Board Answer No: 4

17. A) Genetic Code: -

Genetic code is the combination of three nucleotides which specify a particular amino acid.

B) One Example: -

Genetic code of amino acid Methionine is AUG.

18. Differences Between Chromosome and Nucleosome: -

Chromosome	Nucleosome
1. Chromosome is a thread like vehicle of hereditary information that is physically transmitted from one generation to the next.	1. Nucleosome is a fundamental packaging unit of eukaryotic chromosome. It is absent in prokaryotic chromosome.
2. In eukaryotes, each chromosome consists of a single linear DNA molecule and the associated proteins, while in prokaryotes, the chromosome consists of a single naked circle of DNA.	2. Each nucleosome is a complex of DNA and histone proteins in which the double helical DNA winds around eight molecules of histone.

19. Differences Between Translation and Transcription: -

See Gujranwala Board Answer No: 6

MULTAN BOARD QUESTIONS

1. Define Karyotype. Give its importance.
(Multan Board-2008-)
2. What is the chemical nature of Nucleosome?
(Multan Board-2008-)
3. Name three types of RNA. Give function of each.
(Multan Board-2008-)
4. How DNA polymerase III can initiate synthesis of DNA?
(Multan Board-2008-)
5. What is Euchromatin?
(Multan Board-2008-)
6. What is point mutation? Give an example.
(Multan Board-2008-)
7. What is semiconservative replication of DNA?
(Multan Board-2008-)
8. How histone helps coiling around it?
(Multan Board-2009-)
9. What do you mean by point mutation?
(Multan Board-2009-)
10. What is the contribution of Meselson and Stahl?
(Multan Board-2009-)
11. How histone helps coiling around it?
(Multan Board-2009-)
12. What is karyotype? Give its importance.
(Multan Board-2009-)
13. What is Alkaptonuria?
(Multan Board-2009-)
14. What is the structure of a typical nucleotide?
(Multan Board-2009-)

15. Define Nucleosome. (Multan Board-2010-A)
16. Draw structural formulae of Guanine and Thymine. (Multan Board-2010-A)
17. Differentiate between Chromosomal aberration and Point mutation. (Multan Board-2010-A)
18. Explain Alkaptonuria. (Multan Board-2010-S)
19. Give structural formula of adenine and guanine. (Multan Board-2010-S)
20. Explain Alkaptonuria. (Multan Board-2010-S)
21. Compare the shape and structure of m-RNA and t-RNA. (Multan Board-2010-S)
22. How many Chromosomes are present in Mouse and Sugar cane? (Multan Board-2011-A)
23. What is Central Dogma? Give its two types. (Multan Board-2011-A)
24. What is meant by a Karyotype of a cell? (Multan Board-2011-S)
25. Define Transformation. Name the scientist who worked upon it. (Multan Board-2011-S)
26. What is the contribution of Erwin Chargoff with respect to chemical nature of DNA? (Multan Board-2011-S)
27. Differentiate between Heterochromatin and Euchromatin. (Multan Board-2012-A)
28. Write note on Alkaptonuria. (Multan Board-2012-A)
29. Briefly describe Replication of Lagging Strand of DNA. (Multan Board-2012-A)
30. What is role of Promoter in transcription? (Multan Board-2012-S)
31. How is a newly synthesized mRNA protected in transcription? (Multan Board-2012-S)
32. What is universality of genetic code? (Multan Board-2012-S)
33. Give the functions of the DNA polymerase III. (Multan Board-2013-A)
34. What is karyotype? Give its importance. (Multan Board-2013-A)
35. What is Transcription Bubble? (Multan Board-Old Scheme-2014-A)
36. How is Phosphodiester Bond formed? (Multan Board-Old Scheme-2014-A)

37. What is the role of DNA polymerase III? (Multan Board-Old Scheme-2014-A)
38. Differentiate between Pyrimidines and Purines. (Multan Board-New Scheme-2014-A)
39. What is Alkaptonuria? (Multan Board-New Scheme-2014-A)
40. Differentiate between codon and anticodon. (Multan Board-New Scheme-2014-A)
41. Differentiate between Euchromatin and Heterochromatin. (Multan Board-New Scheme-2015-A)
42. What is Phosphodiester Bond? (Multan Board-New Scheme-2015-A)
43. Differentiate between Template and Coding Strand. (Multan Board-New Scheme-2015-A)

Answers

1. A) Karyotype: -

The particular array of chromosomes that an individual possesses is called its karyotype.

B) Importance of Karyotype: -

1. Karyotypes show marked differences among species and sometimes even among individuals of the same species. Hence a karyotype helps in the identification of chromosomes in the human and other species.
2. Karyotypes of individuals are often examined to detect genetic abnormalities, such as those arising from extra or lost chromosomes.

2. Chemical Nature of Nucleosome: -

Nucleosome is a complex of DNA and histones. DNA has negatively charged phosphate groups.

Total

DNA molecule has 200 base pairs and DNA

molecule

which is wrapped around the core histone proteins

has

146 base pairs.

- b. Histone proteins are positively charged due abundance

of the basic amino acids arginine and lysine. One nucleosome is comprised of two copies of each of histones H2A, H2B, H3 and H4.

3. Names of Three Types of RNA: -

1. Ribosomal RNA (rRNA)
2. Messenger RNA (mRNA)
3. Transfer RNA (tRNA)

B) Function of Three Types of RNA: -

a. Messenger RNA (mRNA): -

Messenger RNA (mRNA) are transcribed from DNA

and travel to ribosomes to direct precisely which amino acids are assembled into polypeptides.

Or

It encodes the amino acid sequence of a protein in its molecule base sequence and serves as templates for protein synthesis. Or
It carries the information that specifies the amino acid sequence of a given polypeptide.

b. Transfer RNA (tRNA): -

Transfer RNA (tRNA) molecules both transport the amino acids to the ribosomes for use in building the polypeptides and also position each amino acid at the correct place on the elongating polypeptide chains.

Or
tRNA carries specific amino acids to the ribosomes to

add to growing polypeptides according to the base sequence in mRNA. Or

It identifies an amino acid and carries it to the ribosome where it is added to growing polypeptide chain during protein synthesis. Or

It brings each amino acid into an association with the mRNA triplet specifying it.

c. Ribosomal RNA (rRNA): -

During translation, rRNA provides the site where polypeptides are assembled. Or

Ribosomal RNA makes up a major part of ribosomes, the cytoplasmic structures on which polypeptides are assembled.

4. Initiation of Synthesis of DNA by Polymerase III: -

DNA polymerase III can not initiate synthesis on its own. It can only add nucleotides to an existing polynucleotide strand providing it 3' OH end. In fact DNA polymerase III requires an RNA primer molecule. This primer is RNA with a sequence of 10 nucleotides complementary to the parent DNA template and is synthesized by an RNA polymerase called primase. DNA polymerase III recognizes primer

and adds DNA nucleotides to it to construct DNA strand. The RNA primer is subsequently degraded and

RNA nucleotides in the RNA primer are replaced by DNA nucleotides.

5. Euchromatin: -

See Gujranwala Board Answer No: 12 (B)

6. Point Mutation with Examples: -

See Gujranwala Board Answer No: 15

7. Semiconservative Replication of DNA: -

See Lahore Board Answer No: 2

8. Histone Helps Coiling Around It: -

Histones are positively charged due to basic amino acids arginine and lysine. They are thus strongly attracted to the negatively charged phosphate groups of the DNA. The histone cores thus act as magnetic forms that promote and guide the coiling of the DNA.

9. Point Mutation: -

See Lahore Board Answer No: 20

10. Contribution of Meselson and Stahl: -

Meselson and Stahl demonstrated that DNA replication is semiconservative.

11. Histone Helps Coiling Around It: -

See Multan Board Answer No: 8

12. Karyotype and Its Importance: -

See Multan Board Answer No: 1

13. Alkaptonuria: -

See Lahore Board Answer No: 17 (A)

14. Structure of a Typical Nucleotide: -

A typical nucleotide comprises a phosphate group linked to a pentose sugar (ribose in RNA, deoxyribose

in DNA) which in turn is linked to either a purine or pyrimidine base (flat ring shaped molecules containing nitrogen). The purine bases within both DNA and RNA are adenine (A) and guanine (G); the pyrimidine bases in DNA are thymine (T) and cytosine (C). In RNA, thymine is replaced by the structurally similar uracil. Or

A typical nucleotide has three parts:

- Pentose sugar—It is 5-carbon monosaccharide. In RNA, it is ribose and in DNA it is deoxyribose.
- A phosphate group—It is present in both DNA and RNA.
- A nitrogen-containing base—Nitrogenous bases are pyrimidine rings (uracil U, cytosine C, Thymine T or purine rings (adenine A, guanine G). C, U, A and G are present in RNA while C, T, A and G are present

in

DNA.

15. Nucleosome: -

- A nucleosome is a 10 nm diameter particle that consists of a core of eight histone molecules which

is

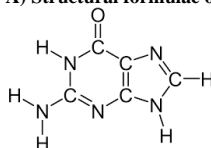
wrapped by two complete turns of DNA molecule of 146 base pairs.

- Nucleosome is the smallest structural unit of chromatin.

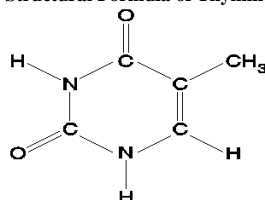
- Many nucleosomes are linked to one another by linker

DNA to form chromatin, structural organization of which is often referred to as beads on a string.

16. A) Structural formulae of Guanine: -



B) Structural Formula of Thymine: -



17. Differences between Chromosomal Aberration and

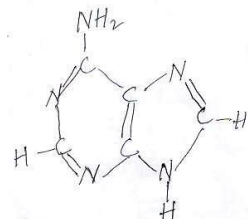
Point mutation: -

See Lahore Board Answer No: 8

18. Alkaptonuria: -

See Lahore Board Answer No: 17

19. A) Structural Formula of Adenine: -



B) Structural Formula of Guanine: -

See Multan Board Answer No: 16 (A)

20. Alkaptonuria: -

See Lahore Board Answer No: 17

21. Comparison of the Shape and Structure of m-RNA

and t-RNA: -

mRNA	tRNA
Shape:- It is uncoiled straight chain.	Shape:- It resembles a clover shape.
Structure:- It is a large single stranded molecule with many nucleotides.	Structure:- It is a small molecule consisting of 70 to 90 nucleotides. Like mRNAs it is single stranded, but is folded back on itself in various places by complementary base pairing to form a complex three dimensional structure.

22. Chromosomes Present in Mouse and Sugar Cane: -

- Forty chromosomes are present in mouse.
- Eighty chromosomes are present in sugarcane.

23. A) Central Dogma: -

All organisms use the basic mechanism of reading and expressing genes called central dogma. The genetic information resides in DNA, which is also the main fountain head. The genetic information flows down into RNA, which is then converted into protein.

Or

The central dogma of gene expression is that DNA, which carries the genetic information, is transcribed into RNA, and RNA is translated to produce a polypeptide chain.

B) Two Types of Central Dogma: -

a. Transcription: -

The first type (or step) of central dogma is the transfer of information from DNA to RNA, which occurs when an mRNA copy of the gene is produced. The process is called Transcription.

b. Translation: -

The second type (or step) of central dogma is the transfer of information from RNA to proteins, which

occurs when the information contained in the mRNA is used to direct the synthesis of polypeptides by ribosomes.

24. Karyotype of a Cell: -

See Lahore Board Answer No: 21

25. A) Transformation: -

See Lahore Board Answer No: 1 (A)

B) Scientist Worked Upon Transformation: -
Frederick Griffith

26. Contribution of Erwin Chargoff with Respect to Chemical Nature of DNA?

Erwin Chargoff made a highly significant discovery. He hydrolysed DNA into its constituents and measured the relative amounts of the four bases. He discovered that:

- In a given sample of DNA, the number of purine molecules equals the number of pyrimidine molecules.
- In particular, the number of adenine molecules equals the number of thymine, and the number of molecules of guanine equals the number of

of cytosine. $A=T$
 $G=C$
 $A+G=T+C$

27. Differences between Heterchromatin and Euchromatin: -

See Lahore Board Answer No: 24

28. Note on Alkaptonuria: -

Garrod and Bateson concluded in 1902 that certain diseases among their patients were more prevalent in particular families. Among many diseases Alkaptonuria was one of them. Garrod studied Alkaptonuria in detail. In alkaptonuria, patients produced urine that contained homogentisic acid. This

substance oxidized rapidly to air, turning the urine black. In normal individuals, homogentisic acid is broken down into simpler substances. With considerable insight Garrod concluded that patients suffering from alkaptonuria lacked the enzyme necessary to catalyze this breakdown.

29. Replication of Lagging Strand of DNA: -

Following steps take place in the replication of lagging strand of DNA:

- On the lagging strand template (parental strand) primase synthesizes an RNA primer in the 5'→3' direction, away from the replication.
- A DNA polymerase III recognizes the primer and adds DNA nucleotides to it to construct an Okazaki fragment (100-200 nucleotides long in eukaryotes and 1000-2000 nucleotides long in prokaryotes) in the 5'→3' direction.
- As the replication fork moves on due to further unwinding of the DNA helix, primase synthesizes another primer close to the replication fork, and DNA

polymerase III jumps ahead 1000-2000 nucleotides toward the replication fork to begin constructing another Okazaki fragment.

d. Subsequently, many Okazaki fragments attached to primers extend along lagging strand.

e. At this point, primers are hydrolyzed by a 5'—3' DNA

polymerase I.

f. After the RNA primers have been removed, DNA polymerase I fills in the gaps left by the RNA primers, leaving nicks in the lagging strand.

g. Nicks in the lagging strand are sealed by DNA ligase.

30. Role of Promoter in Transcription: -

1. Promoter is a DNA sequence at the template strand at

which initiation complex for transcription assembles and transcription starts.

2. There are hundreds of promoters in bacterial cells and

thousands in eukaryotic cells since transcription of every gene is initiated independently at its own promoter.

3. Promoter helps the RNA polymerase to use which of two DNA strands as a template. Promoter recognition

depends upon the sigma factor of RNA polymerase.

4. In prokaryotes, within promoters there are two binding

sites TTGACA also called -35 sequence also called -

35 sequence and TATAAT sequence also called -10 sequence which have affinity for the RNA polymerase. In eukaryotes these sites are at -75' and

-25' sites respectively.

31. Protection of Newly synthesized mRNA: -

1. A newly synthesized mRNA is protected in transcription by adding a cap and a tail to protect mRNA from a variety of nucleases and

phosphatases so that it may remain stable during long journey to ribosomes.

2. The cap is in the form of 7 methyl GTP, which is linked to 5' to 5' with the first nucleotide.

3. The tail is in the form of poly A tail linked to 3' end of

the RNA.

32. Universality of Genetic Code: -

The genetic code is universal. It is the same in almost

all the organisms. For example AGA specifies arginine in bacteria, in human and all other organisms

whose genetic code has been studied. The study of genetic code of mitochondrial DNA however, showed

that genetic code is not that universal. For example UGA codon is normally a stop codon but, in mitochondria it reads as tryptophan.

33. Functions of the DNA Polymerase III:

It is the major enzyme responsible for DNA replication. It synthesizes leading strand as well as

Okazaki fragments in the lagging strand.

34. Karyotype and its Importance: -

See Multan Board Answer No: 1

35. Transcription Bubble: -

See Gujranwala Board Answer No: 1

36. How Phosphodiester Bond Formed: -

Phosphodiester bond is formed when the reaction between the phosphate group of one nucleotide and hydroxyl group of another occurs. It is a

dehydration

synthesis, eliminating a water molecule and forming

a

covalent bond that links two groups. This linkage is called phosphodiester bond because the phosphate group is now linked to the two sugars by a pair of ester (P-O-C) bonds. The two unit polymer results from phosphodiester linkage with a free phosphate group at one end and a free 3 hydroxyl group at the other, so that it can link to other nucleotides.

37. Role of DNA polymerase III: -

See Multan Board Answer No: 33

38. Differences between Pyrimidines and Purines: -

See Gujranwala Board Answer No: 4

39. Alkaptonuria: -

See Lahore Board Answer No: 17 (A)

40. Differences between Codon and Anticodon: -

Codon	Anticodon
It is the sequence of three bases in mRNA which specifies an amino acid.	It is the sequence of three bases in tRNA complementary to an mRNA codon.

41. Differentiate between Euchromatin and

Heterochromatin: -

See Lahore Board Answer No: 24

42. Phosphodiester Bond: -

See Gujranwala Board Answer No: 2

43. Differences between Template and Coding

Strand:

Template Strand	Coding Strand
1. It is the strand of DNA that is transcribed.	1. It is the strand of DNA that is not transcribed.
2. It is the strand of DNA on which RNA transcript is formed.	2. Coding strand has the same sequence as the RNA transcript, except T takes the place of U. Hence, it is the strand which is actually copied and is complementary to the template strand of DNA.
3. It is also known as antisense (-) strand.	3. It is also known as the sense (+) strand.

BAHAWALPUR BOARD QUESTIONS

1. What is semiconservative model of DNA replication? (Bahawalpur Board-2008-

A)

2. What is Alkaptonuria? (Bahawalpur Board-2008-

A)

3. What is template and coding strand? (Bahawalpur Board-2008-

A)

4. Write down structural formula of Adenine and Guanine. (Bahawalpur Board-2009-

A)

5. What are the methods of DNA Replication?
(Bahawalpur Board-2009-A)
6. What are the functions of RNA?
(Bahawalpur Board-2009-A)
7. What are Nucleosomes?
(Bahawalpur Board-2010-A)
8. Why Sanger is famous? (Bahawalpur Board-2010-A)
9. Explain Phenylketonuria. (Bahawalpur Board-2010-A)
10. Differentiate between Heterochromatin and Euchromatin.
(Bahawalpur Board-2011-A)
11. Define Karyotype.
(Bahawalpur Board-2011-A)
12. Define Genetic Code.
(Bahawalpur Board-2011-A)
13. What is Genetic Cause of Alkaptonuria?
(Bahawalpur Board-2012-A)
14. Define Transcription and Translation.
(Bahawalpur Board-2012-A)
15. Define Leading Strand and Lagging Strand.
(Bahawalpur Board-2012-A)
16. Define Karyotype and its importance.
(Bahawalpur Board-2013-A)
17. Differentiate between Conservative and Dispersive Models for DNA Replication.
(Bahawalpur Board-2013-A)
18. Define Translation.
(Bahawalpur Board-New Scheme-2014-A)
19. What is "One Gene One Polypeptide" hypothesis?
(Bahawalpur Board-New Scheme-2014-A)
20. Define Translation.
(Bahawalpur Board-New Scheme-2014-A)
21. Differentiate between Leading and Lagging Strand.
(Bahawalpur Board-New Scheme-2014-A)
22. What is meant by Karyotype?
(Bahawalpur Board-New Scheme-2015-A)
23. How is Phosphodiester Bond formed?
(Bahawalpur Board-New Scheme-2015-A)
24. Define Gene and Genome.
(Bahawalpur Board-New Scheme-2015-A)

Answers

1. **Semiconservative Model of DNA Replication:** -
See Lahore Board Answer No: 3
2. **Alkaptonuria:** -
See Lahore Board Answer No: 17
3. **A) Template Strand:** -

1. The one of the two strands of DNA that is transcribed or copied during transcription is called Template strand. Or
It is the strand of DNA on which RNA transcript is formed.
2. Template strand produces RNA transcript's sequence that is complementary to it.
3. Template strand is also known as the antisense (-) strand.
- B) Coding Strand: -**
 1. The strand which is opposite to the template strand is called Coding strand. Or
The strand of DNA that is not transcribed is called the coding strand.
 2. The coding strand is also known as the sense (+) strand.
 3. Coding strand has the same sequence as the RNA transcript, except T takes the place of U. Hence, it is the strand which is actually copied and is complementary to the template strand of DNA.
4. **Structural Formula of Adenine and Guanine: -**
See Multan Board Answer No: 19
5. **Methods of DNA Replication: -**
 1. **Conservative Method of DNA Replication:**
According to this method of replication, parental double helix would remain intact and generate DNA copies consisting of entirely new molecules.
 2. **Dispersive Method of DNA Replication: -**
According to this method of replication, parental DNA would become dispersed throughout the new copy so that each strand of all the daughter molecules would be a mixture of old and new DNA.
 3. **Semi-Conservative Method of DNA Replication: -**
According to this method of replication, each strand of duplex DNA acts as a template for synthesizing a daughter strand. Each daughter molecule of DNA contains one parental strand and one newly synthesized daughter strand.
6. **Functions of RNA: -**
 1. RNA plays a central role in protein synthesis.
 2. Some RNA molecules are catalytic, that is they function as enzymes.
7. **Nucleosomes: -**
See Lahore Board Answer No: 12
8. **Sanger Famous for: -**
Sanger described the complete sequence of amino acids of insulin.
9. **Phenylketonuria: -**
See Lahore Board Answer No: 9
10. **Differences between Heterochromatin and Euchromatin: -**
See Lahore Board Answer No: 24
11. **Karyotype: -**
See Lahore Board Answer No: 21
12. **Genetic Code: -**
See Lahore Board Answer No: 22
13. **Genetic Cause of Alkaptonuria: -**

A recessive allele is the cause of Alkaptonuria.

14. A) Transcription: -

Transcription is the process of synthesizing a single-stranded RNA complementary to the one of the strands of DNA.

B) Translation: -

It is the decoding of the information in the mRNA

(in

the form of specific sequence of nucleotides) into a specific sequence of amino acids in a polypeptide chain.

15. A) Leading Strand: -

Leading strand is the DNA strand which elongates toward the replication fork and is built up simply by adding nucleotides continuously to its growing 3' end.

Or

It is DNA strand that is synthesized continuously in

a

5' to 3' direction towards the replication fork. Or The newly synthesized strand formed by 5'→3' polymerization in the direction of replication fork is called the leading strand. It is formed against the antiparallel parent strand terminating into 3' end.

B) Lagging Strand: -

Lagging strand is the DNA strand which elongates away from replication fork and is synthesized discontinuously as a series of short segments that

are

later connected. Or

It is DNA strand that grows in an overall 3' to 5' direction, but is synthesized discontinuously in short Okazaki fragments (5' to 3' direction away from the replication fork) that are later joined by DNA ligase. Or

The newly synthesized strand formed 5'→3' polymerization away from replication fork is called the lagging strand.

16. Karyotype and its Importance: -

See Multan Board Answer No: 1

17. Differences between Conservative and Dispersive Models for DNA Replication: -

Conservative Model	Dispersive Model
According to this model, the original DNA molecule remains unaltered, having acted as a template for the two new strands which form the new DNA molecule.	According to this model, different parts of either strand are used to synthesize the new strand, so that following synthesis the original DNA and newly synthesized DNA are dispersed along each strand.

18. Translation: -

See Lahore Board Answer No: 19

19. "One Gene One Polypeptide Hypothesis": -

It states that one gene encodes one polypeptide chain.

It is the modified form of one gene one enzyme hypothesis. Or

Beadle and Tatum proposed one gene-one enzyme hypothesis, that is the function of gene is to provide the information for making an enzyme. Because

many

enzymes contain multiple protein or polypeptide subunits, each encoded by a separate gene the relationship is today more commonly referred to as "one gene – one polypeptide". It states that one gene encodes one polypeptide chain.

20. Translation: -

See Lahore Board Answer No: 19

21. Differences between Leading and Lagging Strand:

Leading Strand	Lagging Strand
1. It elongates towards the replication fork. 2. It is synthesized continuously in 5'→3' direction. 3. It requires only one RNA primer for its initiation.	1. It elongates away from the replication fork. 2. It is synthesized discontinuously in a series of short segments (Okazaki fragments) in 5'→3' direction. 3. It requires many RNA primers, one for each Okazaki fragment.

22. Karyotype: -

See Lahore Board Answer No: 21

23. Formation of Phosphodiester Bond: -

See Multan Board Answer No: 36

24. A) Gene: -

See Faisalabad Board Answer No: 14

B) Genome: -

Genome is the entire DNA sequence of an organism.

Or

A genome is a full set of genes of an individual.

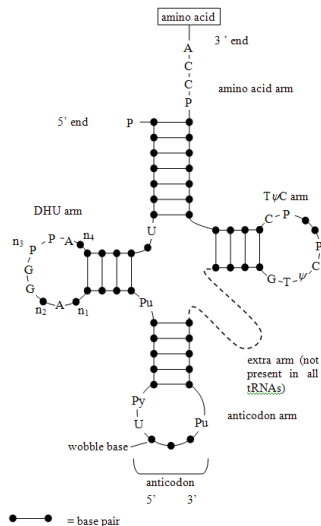
FAISALABAD BOARD QUESTIONS

- Define the term Nucleosome.
(Faisalabad Board-2008-
A)
- Define Okazaki fragments.
(Faisalabad Board-2008-
A)
- Why histones are positively charged?
(Faisalabad Board-2009-
A)
- What is meant by conservative replication of DNA?
(Faisalabad Board-2009-
A)
- Give the importance Meselson-Stahl experiments.
(Faisalabad Board-2010-
A)
- Sketch two dimensional structure of tRNA.
(Faisalabad Board-2010-
A)
- Differentiate between codon and anticodon.
(Faisalabad Board-2010-
A)
- What is phosphodiester bond? How is it formed?
(Faisalabad Board-2011-
A)
- What is the function of RNA polymers in transcription?
(Faisalabad Board-2011-
A)
- Define conservative and semi conservative replication of DNA.
(Faisalabad Board-2012-
A)
- Define sense and antisense strands.

- (Faisalabad Board-2012-
A)
12. What are nucleosomes? (Faisalabad Board-2013-
A)
13. Define Phenylketonuria. (Faisalabad Board-2013-
A)
14. Define gene. (Faisalabad Board-Old Scheme-2014-
A)
15. Compare template and coding strand of DNA.
(Faisalabad Board-Old Scheme-2014-
A)
15. What do you know about semi-conservative
replication? (Faisalabad Board-Old Scheme-2014-
A)
17. What is difference between heterochromatin and
euchromatin?
(Faisalabad Board-New Scheme-2014-
A)
18. Define nucleosome. Give its components.
(Faisalabad Board-New Scheme-2014-
A)
19. How mRNA in eukaryotic cell remain protected from
nucleases and phosphatases?
(Faisalabad Board-New Scheme-2014-
A)
20. What is transformation?
(Faisalabad Board-New Scheme-2015-
A)
21. Differentiate between heterochromatin and
euchromatin. (Faisalabad Board-New Scheme-2015-
A)
22. What is one-gene-one enzyme hypothesis?
(Faisalabad Board-New Scheme-2015-
A)

Answers

- Nucleosome:** -
See Lahore Board Answer No: 12
- Okazaki Fragments:** -
See Lahore Board Answer No: 5
- Histones are Positively Charged:** -
See Gujranwala Board Answer No: 1
- Conservative Replication of DNA:** -
Conservative replication of DNA means parental double helix would remain intact and generate DNA copies consisting of entirely new molecules.
Or
It means the original molecule remains unaltered, having acted as a template for the two new strands which form the new DNA molecule.
- Importance of Meselson-Stahl Experiments:** -
Experiments of Meselson-Stahl proved Semi-conservative replication of DNA.
- Sketch of Two Dimensional Structure of tRNA:** -



Pu = purine, Py = pyrimidine, ψ = pseudouridine, G* = guanosine or 2'-O methyl guanosine, n_1 = 0 to 1, n_2 = 1 to 2, n_3 = 2 to 3, n_4 = 3 to 4 nucleoside residues in DHU arm depending on the tRNA. In some tRNAs the DHU arm has only 3 base pairs.

- Differences between Codon and Anticodon:** -
See Multan Board Answer No: 40

- A) Phosphodiester Bond:** -

Phosphodiester bond is the linkage that links nucleotides in nucleic acid.

- B) Formation of Phosphodiester Bond:** -

- Phosphodiester bond is formed when phosphate group of one nucleotide binds to the 3' hydroxyl group of the sugar of another by condensation reaction releasing water molecule.
- The bond is called phosphodiester because phosphate group is now linked to the two sugars by means of a pair of ester (P-O-C).

- Function of RNA Polymerase in Transcription:** -
See Lahore Board Answer No: 23

- A) Conservative Replication of DNA:** -

Conservative replication of DNA is defined as: "The original molecule remains unaltered, having acted as a template for the two new strands which form the new DNA molecule".

- B) Semi-Conservative Replication of DNA:** -

Semi-conservative replication of DNA is defined as: "The original two strands are separated and new strands synthesized complementary to each. This would create two new DNA molecules, each containing one original template and one newly synthesized".

- A) Sense Strand:** -

The strand of DNA that is not transcribed is called the Sense strand.

- B) Antisense Strand:** -

The one of the two strands of DNA that is transcribed

- or copied during transcription is called Antisense strand.
- 12. Nucleosomes: -**
See Lahore Board Answer No: 12
- 13. Phenylketonuria: -**
Phenylketonuria is a disorder caused by point mutation in which an enzyme (phenylalanine hydroxylase) necessary for breakdown of phenylalanine is lacking. Phenylalanine accumulates in the blood stream of infant and interferes with the development of brain cells. Infants with phenylketonuria suffer severe mental retardation, and affected individuals rarely live more than 30 years.
- 14. Gene: -**
The sequence of nucleotides that determines the amino acid sequence of a protein is called a gene. Or The length of DNA specifying the amino acid sequence of a polypeptide is a gene. Or
- It is the unit of hereditary.
 - It has information needed to code for a polypeptide.
- Or
A gene is a DNA nucleotide sequence that carries the information needed to produce a specific RNA or potential product. Or
It is hereditary unit specifying the production of a distinct protein (e.g., an enzyme) or RNA.
- 15. Comparison of Template and Coding Strand of DNA: -**
- 16. Semi-Conservative Replication: -**
See Lahore Board Answer No: 2
- 17. Difference between Heterochromatin and Euchromatin: -**
See Lahore Board Answer No: 24
- 18. A) Nucleosome: -**
Nucleosome is the subunit of chromatin and many nucleosomes give the structural organization of chromatin as beads on a string.
- B) Components of Nucleosome: -**
DNA and eight histone proteins are the components of a nucleosome.
- 19. Protection of Eukaryotic mRNA: -**
mRNA in eukaryotic cell is remain protected by a cap and a tail.
- 1. Cap: -**
- A cap is added to first nucleotide transcribed by RNA polymerase.
 - The linkage of cap to mRNA is different, because the riboses of 7 methyl-guanosine and the terminal nucleotide of mRNA are linked by a 5' to 5' triphosphate bridge.
 - The cap has no free phosphates, and thus protected against attack by phosphatases and other nucleases.
- 2. Tail: -**
- A sequence of polyadenylic acid (AAAA.....) called

- poly A tail is attached to 3' end of mRNA.
- This poly A segment is 100 to 200 nucleotides long.
 - Poly A tail has a role in promoting mRNA stability.
- 20. Transformation: -**
See Lahore Board Answer No: 1 (A)
- 21. Differences between Heterochromatin and Euchromatin: -**
See Lahore Board Answer No: 24
- 22. One-Gene-One Enzyme Hypothesis: -**
It states that one gene encodes one enzyme. Or One gene one enzyme hypothesis states that genes produce their effect by specifying the structure of the enzymes and each gene encodes the structure of single enzyme.

RAWALPINDI BOARD QUESTIONS

- Define a transcription bubble.
(Rawalpindi Board-2010-
A)
- Why Vernon Ingram is famous for?
(Rawalpindi Board-2010-
A)
- What is the role of DNA polymerase I and DNA ligase?
(Rawalpindi Board-2010-
A)
- What are leading and lagging strands?
(Rawalpindi Board-2010-
A)
- Differentiate between Transcription and Translation.
(Rawalpindi Board-2011-
A)
- Define karyotype and nucleosome.
(Rawalpindi Board-2011-
A)
- What is karyotype?
(Rawalpindi Board-2012-
A)
- Differentiate between heterochromatin.
(Rawalpindi Board-2012-
A)
- What is phosphodiester bond?
(Rawalpindi Board-2012-
A)
- What are Okazaki fragments?
(Rawalpindi Board-2013-
A)
- What is nucleosome
(Rawalpindi Board-New Pattern-2014-
A)
- Define transcription.
(Rawalpindi Board-New Pattern-2014-
A)
- Differentiate between Euchromatin and Heterochromatin.
(Rawalpindi Board-New Pattern-2015-
A)
- Write contribution of Rosalind Franklin.
(Rawalpindi Board-New Pattern-2015-
A)
- Give various types of chromosomes depending upon location of centromere.
(Rawalpindi Board-New Pattern-2015-
A)

Answers

1. **Transcription Bubble: -**
See Gujranwala Board Answer No: 11
2. **Vernon Ingram is Famous for: -**
Vernon Ingram in 1956 discovered the molecular basis of sickle cell anemia.
3. **A) Role of DNA Polymerase I: -**
DNA polymerase I removes RNA segments and replaces them with DNA. Or
1. It plays a supporting role in DNA replication by polymerization. It fills the gaps between the fragments of DNA.
2. It removes RNA segments.
- B) DNA Ligase: -**
1. It is the enzyme that links together Okazaki fragments in DNA replication of the lagging strand.
2. It also links other broken areas of the DNA backbone.
DNA ligase joins the Okazaki fragments together.
Or
It is the enzyme which catalyzes the formation of a phosphodiester bond between the 3'-hydroxyl at one end of the Okazaki fragment and the 5'-phosphate group of an adjacent reaction.
4. **Leading Strand and Lagging Strand: -**
See Bahawalpur Board Answer No: 15
5. **Differences between Transcription and Translation: -**
See Gujranwala Board Answer No: 6
6. **A) Karyotype: -**
The particular array of chromosomes that an individual possesses is called its karyotype.
- B) Nucleosome: -**
Nucleosome is a beadlike structure with 146 base pairs of DNA wrapped around a disc shaped core of histone molecules (two each of four different histone types).
7. **Karyotype: -**
See Lahore Board Answer No: 21
8. **Differences between heterochromatin and Euchromatin: -**
See Lahore Board Answer No: 24
9. **Phosphodiester Bond: -**
See Gujranwala Board Answer No: 2
10. **Okazaki Fragments: -**
See Lahore Board Answer No: 5
11. **Nucleosome: -**
See Lahore Board Answer No: 12
12. **Transcription: -**
See Bahawalpur Board Answer No: 14 (A)
13. **Differences between Euchromatin and Heterochromatin: -**
See Lahore Board Answer No: 24
14. **Contribution of Rosalind Franklin: -**
Rosalind Franklin provided X-ray diffraction data of DNA, suggesting DNA molecule a shape of a helix with a diameter of 2 nm and a complete helical turn every 3.4 nm, that enabled Watson and Crick to propose their model of DNA.

15. Various Types of Chromosomes Depending Upon**Location of Centromere: -**

See Gujranwala Board Answer No: 9

SARGODHA BOARD QUESTIONS

1. What is the importance of positive charge on histones?
(Sargodha Board-2010-
A)
2. Why cap and tail is added to eukaryotic RNA?
(Sargodha Board-2010-
A)
3. Distinguish between leading and lagging strand of DNA.
(Sargodha Board-2010-
A)
4. Give the chemical composition of RNA.
(Sargodha Board-2011-
A)
5. How does mRNA strand remain stable during its journey from nucleus to cytoplasm?
(Sargodha Board-2011-
A)
6. What is nucleosome?
(Sargodha Board-2012-
A)
7. How many chromosomes are present in Sugarcane and Mosquito?
(Sargodha Board-2012-
A)
8. Draw structural formula of Guanine.
(Sargodha Board-2012-
A)
9. Define Karyotype? What does it indicate?
(Sargodha Board-2013-
A)
10. What is phosphodiester bond? How is it formed?
(Sargodha Board-2013-
A)
11. Define promoter.
(Sargodha Board-New Scheme-2014-
A)
12. What is Central Dogma?
(Sargodha Board-New Scheme-2014-
A)
13. What is Nucleosome?
(Sargodha Board-New Scheme-2014-
A)

Answers

1. **Importance of Positive Charge on Histones: -**
Positive charge on histones due to arginine and lysine is strongly attracted to the negatively charged phosphate groups of the DNA. Thus histone cores act as magnetic forms that promote and guide the coiling of the DNA.
2. **Reason of Addition of Cap and Tail to Eukaryotic RNA: -**
Cap and tail are added to eukaryotic mRNA because they play a role in the stability of eukaryotic mRNAs by protecting them from degradation by a variety of nucleases and phosphatases.
3. **Differences between Leading and Lagging Strand of DNA: -**

See Bahawalpur Board Answer No: 21

4. Chemical Composition of RNA: -

RNA has a phosphate group, a ribose sugar and A, U, G and C bases.

5. Stability of mRNA strand During its Journey from

Nucleus to Cytoplasm: -

mRNA strand remains stable during its journey from nucleus to cytoplasm by addition of 7 methyl GTP cap linked 5' to 5' with the first nucleotide and a poly A tail at the 3' end of the RNA.

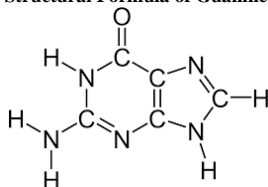
6. Nucleosome: -

See Lahore Board Answer No: 12

7. Number of Chromosomes Present in Sugarcane and Mosquito: -

1. Six chromosomes are present in mosquito.
2. Eighty chromosomes are present in sugarcane.

8. Structural Formula of Guanine: -



9. A) Karyotype: -

See Lahore Board Answer No: 21

B) What Does Karyotype Indicate: -

1. Karyotype indicates the number of chromosomes, relative size, position of centromere, length of the arms and secondary constriction of chromosomes of an individual.
2. Karyotypes also show marked differences among species and sometimes even among individuals of the same species.

10. Phosphodiester Bond and its Formation: -

See Faisalabad Board Answer No: 8

11. Promoter: -

1. It is a DNA region to which RNA polymerase binds when initiating transcription. Or
It is the nucleotide sequence in DNA template strand to which RNA polymerase attaches to begin transcription. Or
It is a sequence of DNA bases on the DNA template strand to which RNA polymerase binds prior to making an RNA copy of the gene.
2. In prokaryotes, within promoters there are two binding sites TTGACA also called -35 sequence also called -35 sequence and TATAAT sequence also called -10 sequence which have affinity for the RNA polymerase. In eukaryotes these sites are at -75 and -25 sites respectively.
3. Promoter is located at the upstream of the gene.
4. Promoter sequence is not copied.

12. Central Dogma: -

Central dogma is the flow of biological information that is from DNA, the carrier of genetic information, to RNA to protein. This was first articulated by Crick.

Since:

- a. In some viruses the genetic material is RNA rather than DNA.
- b. In retroviruses the RNA of the virus is used to make DNA, which is then used to make more viral RNA. Hence, revised view of the Central Dogma can be restated:
Information can flow from nucleic acid to protein, or from one kind of nucleic acid to another, but not from protein to nucleic acid or from protein to protein.

13. Nucleosome: -

Nucleosome is a fundamental bead like unit of chromatin which is composed of core of histone octamer complexed with 146 base pairs of DNA. (Note ---Although nucleosome was originally defined as a bead plus a DNA segment that links it to an adjacent nucleosome, today the term more commonly refers only to bead itself, that is, the eight histones and the DNA wrapped around them).

DERA GHAZI KHAN BOARD QUESTIONS

1. Define the term Nucleosome. (D.G.K. Board-2009-A)
2. Write two examples of point mutation. (D.G.K. Board-2009-A)
3. Define the term Alkaptonuria. (D.G.K. Board-2009-A)
4. Give two step of central dogma. (D.G.K. Board-2010-A)
5. What is alkaptonuria? (D.G.K. Board-2010-A)
6. Comment that DNA replicate in semiconservative manner. (D.G.K. Board-2010-A)
7. Define Transcription. (D.G.K. Board-2011-A)
8. What are nucleotides? (D.G.K. Board-2011-A)
9. Draw structural formula of Purines. (D.G.K. Board-2011-A)
10. What is translation? (D.G.K. Board-Group-I-2012-A)
11. Describe briefly Sickle cell anemia. (D.G.K. Board-Group-I-2012-A)
12. What are the functions of DNA polymerase III? (D.G.K. Board-Group-I-2012-A)
13. How Nucleosome is formed?

- (D.G.K. Board-Group-II-2012-
A)
14. What is Okazaki fragment?
(D.G.K. Board-Group-II-2012-
A)
15. How do mutagens cause mutation?
(D.G.K. Board-Group-II-2012-
A)
16. What is Karyotype? Give its role.
(D.G.K. Board-Group-I-2013-
A)
17. Define chromosomal theory of inheritance.
(D.G.K. Board-Group-I-2013-
A)
18. Define Karyotype. (D.G.K. Board-Group-II-2013-
A)
19. Differentiate between Heterochromatin and
Euchromatin. (D.G.K. Board-Group-II-2013-
A)
20. Differentiate between Heterochromatin and
Euchromatin.
(D.G.K. Board-New Scheme-Group-I--2014-
A)
21. Give structural formulae of adenine and thymine.
(D.G.K. Board-New Scheme-Group-I--2014-
A)
22. What is Karyotype? Give its importance.
(D.G.K. Board-New Scheme-Group-I--2014-
A)
23. Give function of RNA polymerase in Transcription.
(D.G.K. Board-New Scheme-Group-II--2014-
A)
24. Define Codon and Anti-codon.
(D.G.K. Board-New Scheme-Group-II--2014-
A)
25. Differentiate between Transcription and Replication.
(D.G.K. Board-New Scheme-Group-II--2014-
A)
26. Define semi-conservative replication.
(D.G.K. Board-New Scheme-Group-I-2015-
A)
27. Define Transformation.
(D.G.K. Board-New Scheme-Group-I-2015-
A)
28. Compare template strand with coding strand.
(D.G.K. Board-New Scheme-Group-I-2015-
A)
29. Differentiate between Heterochromatin and
Euchromatin.
(D.G.K. Board-New Scheme-Group-II-2015-
A)
30. What is Central Dogma?
(D.G.K. Board-New Scheme-Group-II-2015-
A)
31. What do you know about Okazaki Fragment?
(D.G.K. Board-New Scheme-Group-II-2015-
A)

Answers

1. **Nucleosome:** -
See Lahore Board Answer No: 14
2. **Two Examples of Point Mutation:** -
See Gujranwala Board Answer No: 15 (B)
3. **Alkaptonuria:** -

See Lahore Board Answer No: 17

4. Two Steps of Central Dogma: -

1. The first step of central dogma is the transfer of information from DNA to RNA which occurs when an mRNA copy of the gene is produced.
The process is called transcription. Or
In the first step of central dogma DNA template direct the synthesis of an RNA molecule. The nucleotide of one strand of (the template) duplex DNA is copied to produce a complementary single-stranded RNA molecule. This process is termed transcription.
2. The second step of central dogma is the transfer of information from RNA to protein which occurs when information contained in the mRNA is used to direct the synthesis of polypeptides by ribosomes. Or
The second step of central dogma is the synthesis of a polypeptide with a specific sequence in a process termed translation.

5. Alkaptonuria: -

See Lahore Board Answer No: 17

6. Comments on Semiconservative Replication of DNA: -

- DNA replicates in semiconservative manner as the sequence of the original duplex is conserved after one round of replication, duplex itself is not. Instead, each strand of the duplex becomes part of another duplex. Or
Because half of each daughter helix has come from the parent helix, DNA replication is said to be semi-conservative.

7. Transcription: -

See Lahore Board Answer No: 6

8. Nucleotides: -

Nucleotide is a building unit of DNA or RNA, consisting of a sugar, phosphate and base.

9. Structural Formula of Purines: -

See Multan Board Answer No: 19

10. Translation: -

See Lahore Board Answer No:

11. Sickle Cell Anemia: -

See Lahore Board Answer No: 4

12. Functions of DNA Polymerase III: -

See Board Answer No:

13. How Nucleosome Formed: -

Nucleosome is formed when positively charged (due to arginine and lysine) histone core is strongly attached to the negatively charged phosphate groups of DNA due to which coiling of DNA around histone core occurs.

14. Okazaki Fragment: -

See Lahore Board Answer No: 5

15. How Do Mutagens Cause Mutation: -

1. Ionizing radiations are most high energetic forms of electromagnetic radiations. These radiations create free radicals, ionized atoms with unpaired electrons.

of These free radicals react with and alter the structure of other molecules including DNA. When they combine with DNA, one base may be changed into another.

2. Some chemical mutagens react with specific bases in the DNA leading to mistakes in complementary base pairing when the DNA molecule is replicated. Other mutagens cause nucleotide pairs to be inserted into or deleted from the DNA molecule.

16. Karyotype and its Role: -

See Multan Board Answer No: 1

17. Chromosomal Theory of Inheritance:

1. Hereditary material must reside within the nuclei of the gametes.
2. Chromosomes segregate during meiosis in a manner similar to that exhibited by the elements of Mendel's model.
3. Gametes have only one copy of each pair of homologous chromosomes; diploid individuals have two copies.
4. During meiosis, each pair of homologous chromosomes orients on the metaphase independent of any other pair.

18. Karyotype: -

See Lahore Board Answer No: 21

19. Differences between Heterochromatin and Euchromatin: -

See Lahore Board Answer No: 24

20. Differences between Heterochromatin and Euchromatin: -

See Lahore Board Answer No: 24

21. A) Structural Formula of Adenine: -

See Multan Board Answer No: 19 (A)

B) Structural Formula of Thymine: -

See Multan Board Answer No: 16 (B)

22. Karyotype and its Importance: -

See Multan Board Answer No: 1

23. Function of RNA Polymerase in Transcription: -

See Exercise Chapter No: 20 Answer No: 2

24. A) Codon: -

1. It is the basic unit of genetic code.
2. It is a sequence of three adjacent nucleotides in DNA

or RNA that code for one amino acid.

B) Anti-Codon: -

1. It is three nucleotide sequence in the tRNA molecule.
2. It is complementary to three bases of an amino acid specifying codon in mRNA.

25. Differences between Transcription and Replication: -

Transcription	Replication
1. It is the process by which RNA is synthesized from a DNA template.	1. It is the process by which DNA is duplicated.
2. RNA polymerase enzyme catalyzes transcription.	2. DNA polymerase catalyzes replication.

26. Semi-Conservative Replication: -

See Lahore Board Answer No: 2

27. Transformation: -

See Lahore Board Answer No: 1 (A)

28. Comparison of Template Strand with Coding Strand: -

See Multan Board Answer No: 43

29. Differences Between Heterochromatin and Euchromatin: -

See Lahore Board Answer No: 24

30. Central Dogma: -

See Multan Board Answer No: 23

31. Okazaki Fragment: -

See Lahore Board Answer No: 5

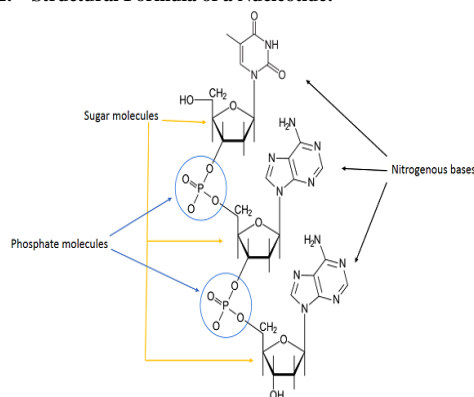
SAHIWAL BOARD QUESTIONS

1. Differentiate between heterochromatin and Euchromatin. (Sahiwal Board-2013-A)
2. Describe the structural formula of a nucleotide. (Sahiwal Board-2013-A)
3. What is alkatonuria? (Sahiwal-Old Scheme-2014-A)
4. How histone help DNA to coil? (Sahiwal-Old Scheme-2014-A)
5. What are template or antisense and coding or sense strands? (Sahiwal-Old Scheme-2014-A)
6. What is point mutation? Give example. (Sahiwal-New Scheme-2014-A)
7. Differentiate between heterochromatin and euchromatin. (Sahiwal-New Scheme-2014-A)
8. What do you know about nucleosome? (Sahiwal Board-New Scheme-2015-A)
9. Give the sequences of nonsense codons? (Sahiwal Board-New Scheme-2015-A)
10. What will happen to replication of DNA, if primase is not present? (Sahiwal Board-New Scheme-2015-A)

Answers

1. Differences between heterochromatin and Euchromatin: -

See Lahore Board Answer No: 24

2. Structural Formula of a Nucleotide: -**3. Alkaptonuria: -**

See Lahore Board Answer No: 17

4. Histone Helping DNA to Coil: -

See Multan Board Answer No: 8

5. Template or Antisense and Coding or Sense Strands: -

See Board Answer No:

6. Point Mutation with Example: -

See Gujranwala Board Answer No: 15

7. Differences between Heterochromatin and Euchromatin: -

See Lahore Board Answer No: 24

8. Nucleosome: -

See Lahore Board Answer No: 14

9. Sequences of Nonsense Codons: -

1. UAA
2. UAG
3. UGA

10. Effect of Absence of Primase on DNA**Replication:-**

If primase is not present, an RNA primer can not be constructed and replication can not be started because DNA polymerase cannot initiate synthesis on its own and it can only add DNA nucleotides to already present RNA primer (constructed by primase) to construct the DNA strand.

C h a p t e r ----

21

CELL CYCLE

2 SQs

I) From Exercise:-**Questions**

1. Differentiate between necrosis and apoptosis.
2. What are the functions of mitotic apparatus?
3. How can you identify the cancer cells?
4. Give importance and significance of meiosis.
5. Define chromosomal non-disjunction.

6. What are symptoms of Turner's syndrome?
7. Define cell cycle. Highlight its importance and significance.
8. Is interphase a resting phase? Why?
9. In what respect does mitosis in plant cells differ from that in animal cells?

Answers**1. Differences Between Necrosis and Apoptosis: -**

Necrosis	Apoptosis
1. In necrosis, cells are murdered by killing signals from other cells.	1. In apoptosis cell commits suicide in the absence of survival signals.
2. In necrosis, injured cells swell and burst, releasing the intracellular contents.	2. During this process the dying cells shrink and condense ultimately split up, thus releasing small membrane bound apoptic bodies which are generally phagocytosed by other cells.
3. Cellular contents can damage neighbouring cells and cause inflammation.	3. No intracellular contents are released, no inflammatory response is triggered, so no neighbouring cells are harmed.

2. Functions of Mitotic Apparatus: -

Mitotic apparatus is designed to attach and capture chromosomes, aligning them and finally separating them so that equal distribution of chromosomes is ensured.

Or

It provides the framework for chromosome movement during cell division.

3. Identification of Cancer Cells: -

1. They are less differentiated than normal cells.
2. They exhibit the characteristics of rapidly growing cells, that is, high nucleus to cytoplasm ratio, prominent nucleoli and many mitosis.
- Or
1. Cancer cells are less differentiated and non-specialized.
2. They look distinctly abnormal and don't perform normal functions.
3. The nuclei of cancer cells are enlarged and may contain an abnormal number of chromosomes. They have three to twenty mutant genes. Their genes have extra copies.
4. They can enter the cell cycle repeatedly, and in this way seem immortal.
5. Cancer cells fail to undergo apoptosis even though they are abnormal cells.
6. Cancer cells do not adhere well to the neighbouring normal cells.
6. Cancer cells produce enzymes that allow them to invade underlying tissues. Then they travel through the blood and lymph to start cancer cells and tumor elsewhere in the body.

4. Importance and Significance of Meiosis: -

1. Meiosis takes place at the time of sexual cell (gamete)

formation, spore formation in plants, halving the number of chromosomes in each, which is restored after fertilization and maintains chromosome number

constant generation after generation.

2. Crossing over (exchange of segments of parental chromosomes resulting in a large number of recombinations) and random separation of homologous chromosomes (producing wide range of variety of gametes) are the two phenomena of

meiosis

which cause variations and modifications in the genome. These variations are not only the bases of evolution but also make every individual specific, particular and unique in his characteristics.

5. Chromosomal Non-Disjunction: -

Chromosomal non-disjunction is the failure of one

or more homologous chromosome pairs to separate properly during cell division. Or Failure of chromosome to separate (disjoin) in cell division is called non-disjunction.

2. It is abnormal separation of sister chromatids or of homologous chromosome caused by their failure to disjoin (move apart) properly during mitosis or meiosis.

3. Non-disjunction leads to gametes with the gain or loss

of a chromosome.

6. Symptoms of Turner's Syndrome: -

The individuals with Turner's syndrome are sterile females of short stature, with a webbed neck (folds

of skin around neck and shoulders) and sex organs that never fully mature during puberty. The mental abilities of such individuals are in the low-normal range.

7. A) Cell Cycle: -

1. The repeating sequence of growth, DNA replication and division through which cells pass each

generation

is called Cell cycle.

2. It consists of mitosis, cytokinesis and the stages of interphase.

3. The length of the cycle varies considerably in different

types of cells.

B) Importance and Significance: -

Cell cycle is a phenomenon by which cellular

material

is divided between daughter cells.

8. Interphase, A Resting Phase: -

Interphase is not a resting phase because it is a period

of great biochemical activities in which cell normally

grows in size and prepares itself for next division and

duplicates its DNA.

9. Mitosis in Plant Cells Different From That In Animal Cells: -

Mitosis in Plant Cells	Mitosis in Animal Cells
1. Plants lack visible	1. Spindle microtubules

centrioles, instead they have its analogous region from which spindle microtubules originate.

2. Cytokinesis occurs by formation of membrane structure, phragmoplast formed from Golgi vesicles and microtubules.
3. Shape of the plant cell does not change greatly because it is surrounded by rigid cell wall.

originate from centrioles.

2. Cytokinesis occurs by contractile ring made of actin and myosin and cleavage furrow.

3. Shape of the animal cell changes greatly.

II) From Punjab Boards:-

LAHORE BOARD QUESTIONS

1. What is Mongolism? (Lahore Board-2008-A)

2. What is metastasis? (Lahore Board-2009-A)

3. Differentiate between necrosis and apoptosis. (Lahore Board-2009-A)

4. How does anaphase I of meiosis differ from the anaphase of mitosis? (Lahore Board-2009-A)

5. Sketch and label cell cycle. (Lahore Board-2010-A)

6. Explain cytokinesis in plants. (Lahore Board-2010-A)

7. Describe changes occur during G1 phase. (Lahore Board-2011-A)

8. Cancer is an uncontrolled cell division, explain. (Lahore Board-2011-A)

9. What is the importance of a bivalent formation? (Lahore Board-Group-I-2012-A)

10. Differentiate between interphase and mitotic phase. (Lahore Board-Group-II-2012-A)

11. What is metastasis and its importance? (Lahore Board-Group-I-2013-A)

12. What happens during metaphase I? (Lahore Board-Group-I-2013-A)

13. How Turner's syndrome is caused and give its features? (Lahore Board-Group-I-2013-A)

14. What is mitotic apparatus? Give its function. (Lahore Board-Group-II-2013-A)

15. Give Events of Zygotene. (Lahore Board-Group-II-2013-A)

16. Give two main importance of meiosis. (Lahore Board-Group-II-2013-A)

17. Differentiate between apoptosis and necrosis. (Lahore Board-New Scheme-Group-I) (2014-A)

18. Describe causes and symptoms of Down's syndrome. (Lahore Board-New Scheme-Group-I)

(2014-A)

19. What is Turner's syndrome?
(Lahore Board-New Scheme-Group-II)
(2014-A)
20. Explain tumor.
(Lahore Board-New Scheme-Group-II)
(2014-A)
21. How do karyokinesis and cytokinesis phase of cell division differ?
(Lahore Board-New Scheme-Group-II)
(2014-A)

Answers

1. Mongolism: -

- Mongolism results from trisomy of chromosome 21.
- Mongolism is an inherited condition in which individual has flat, broad face, squint eyes with the skin fold in the inner corner, and protruding tongue and is physically and mentally retarded.

2. Metastasis: -

- Spread of tumor cells and establishment of secondary areas of growth is called Metastasis.
- Cells that leave the tumor and spread throughout the body, forming new tumors at distant sites are called metastases or metastatic cells.
- Metastatic cells have following properties:
 - They break their contents with other cells and overcome the restriction on cell movement provided by basal lamina and other barriers, ultimately metastatic cells can invade other parts of the body.
 - They proliferate, unlimitedly, without considering the checks or programmes of the body.

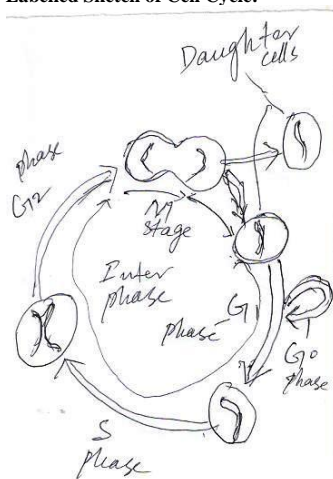
3. Differences Between Necrosis and Apoptosis: -

Necrosis	Apoptosis
1. It is uncontrolled, accidental murder of severely injured cells.	1. It is controlled, intentional way of removing individual cells that are not needed.
2. In necrosis, the dying cells are passive victims.	2. In apoptosis, the cells actively participate in their own deaths i.e. they suicide.
3. In necrosis, the injured cells swell and rupture.	3. A cell signaled to commit suicide detaches itself from its neighbouring cells, then shrinks into a small membrane bounded apoptotic body that is phagocytosed by other cells.
4. Intracellular contents are released into the extracellular fluid.	4. No intracellular contents are released.
5. Release of intracellular contents into the surrounding tissues initiates an inflammatory response at the damaged site.	5. No inflammatory response is triggered.
6. Inflammation response can potentially harm healthy neighbouring cells.	6. Neighbouring cells are not damaged.

4. Prophase I of Meiosis Different From the Prophase of Mitosis: -

Anaphase I of Meiosis	Anaphase of Mitosis
1. Two sister chromatids of each chromosome are separated.	1. Two homologues in each bivalent, each with two sister chromatids united by the kinetochore, are separated.
2. Daughter chromatids are identical to each other and their parents.	2. The homologous chromosomes which are separated are different from each other and their parents due to crossing over.

5. Labelled Sketch of Cell Cycle: -



6. Cytokinesis in Plants: -

- Following steps take place in cytokinesis of plants:
- Vesicles originate from Golgi complex during metaphase.
 - These vesicles line up in the centre of dividing cell at the end of telophase and fuse to form phragmoplast.
 - The membrane of vesicles becomes the plasma membrane of the daughter cells.
 - These vesicles also contain materials for future cell wall such as precursors of cellulose and pectin.

7. Changes Occure During G₁ Phase: -

- Cell grows in size.
- Specific enzymes are synthesized.
- DNA base units are accumulated for the DNA synthesis.

8. Cancer, An Uncontrolled Cell Division: -

Cancer is an uncontrolled cell division because cell division never stops in a cancerous line of cells. Cancer cells divide in unregulated and un-controlled fashion without the body's need. Cancerous cells are virtually immortal—until the body in which they reside dies.

9. Importance of a Bivalent Formation: -

1. Bivalent formation keeps homologous chromosomes together and closely aligned and helps in the separation of homologous chromosomes.
2. It is involved in crossing over and thus recombination of genetic material.

10. Differences between Interphase and Mitotic Phase:

Interphase	Mitotic phase
<ol style="list-style-type: none"> 1. It is the non-dividing initial phase of the cell cycle as the interval between two divisions. 2. It is typically a longest phase. 3. Cell grows in this phase. 4. It is the phase during which DNA and most of other molecules required by the cell are synthesized. 5. Genetic material is present in the form of chromatin. 6. It is sub-divided into G₁, S and G₂ phase. 	<ol style="list-style-type: none"> 1. It is the dividing phase of the cell cycle. 2. It is smaller phase as compared to interphase. 3. No growth occurs in this phase, instead smaller daughter cells are formed at the end of this phase. 4. It is a phase in which mature cell splits into daughter cells. 5. It is the phase of condensation of chromosomes from chromatin within the nucleus. 6. It is sub-divided into two phases i.e. karyokinesis (with four phases viz., prophase, metaphase, anaphase and telophase) and cytokinesis.

11. A) Metastasis: -

The term metastasis is applied to spreading of cancer cells to other parts of the body.

B) Importance of Metastasis: -

Metastasis is responsible for the proliferation of multiple malignant tumors any where in the body away from the site of their original appearance.

12. What Happens During Metaphase I: -

1. Nuclear membrane disorganizes at the beginning of this phase.
2. Spindle fibers originate and the kinetochore fibers attach to the kinetochore of homologous chromosomes from each pole and arrange bivalents at the equator.
Or
1. Nuclear envelope has disappeared.
2. Kinetochore of sister chromatids fuse and function as one and only one side of kinetochore of each homologue in a bivalent faces outward.
3. Spindle microtubules attach to kinetochore proteins only on the outside of each centromere. In this way centromeres of two homologues in each bivalent attach to the spindle microtubules originating from opposite poles.
4. Each bivalent with joined pair of homologues then lines up on the metaphase plate.

13. A) Cause of Turner's Syndrome: -

2. It results from a fusion of an O (without X chromosome) gamete and a normal X gamete resulting an XO zygote. XO zygote develops into an individual with Turner's syndrome.

B) Features of Turner's Syndrome: -

The individuals with Turner's syndrome have female appearance with short stature, webbed neck, without ovaries and complete absence of germ cells.

14. A) Mitotic Apparatus: -

1. Mitotic apparatus is a specialized microtubule structure including centriole, aster and spindle.
2. It is larger than nucleus.

B) Function of Mitotic Apparatus: -

Mitotic apparatus is designed to attach and capture chromosomes, aligning them and finally separating them so that equal distribution of chromosomes is ensured.

15. Events of Zygotene: -

1. The homologous chromosomes undergo pairing in a process called synapsis of the chromosomes.
2. This pairing is highly specific and involves in the formation of a special structure that can be observed under electron microscope and is called the synaptonemal complex (SC).
3. The pairing does not have a special starting point.
4. The pairing is remarkable, exact and specific. It takes place point for point in each homologue. The two homologues do not fuse during pairing and form a structure known as bivalent or tetrad.

16. Two Main Importances of Meiosis: -

1. Meiosis is the mechanism by which genetic variation is brought about by crossing over and random separation of homologous chromosomes.
2. It halves the number of chromosomes before formation of gametes, hence prevents the doubling of chromosomes in zygotes when gametes unite at fertilization.

17. Differences between Apoptosis and Necrosis: -

See Lahore Board Answer No:

18. A) Cause of Down's Syndrome: -

It is the result of autosomal non-disjunction in the ova of aged female in which 21st pair of chromosome fails to separate resulting in gamete with two 21st chromosomes instead of one and total of 24 chromosomes. When this ovum is fertilized by a normal sperm, the zygote has 47 (2n + 1) chromosomes with three 21st chromosomes and develops into a Down's syndrome child.

B) Symptoms of Down's Syndrome: -

The affected individuals have flat, broad face, sequent eyes with the skin fold in corner, and protruding

tongue, mental retardation, and defective development of central nervous system.

19. Turner's Syndrome: -

1. It is monosomy for the X chromosome.
2. It occurs in one in about 6000 births.
3. The individuals affected with Turner's syndrome have one missing X chromosome with only 45 chromosomes (44 autosomes + X).
4. Individuals with this condition often do not survive pregnancy and are aborted.
5. Individuals with Turner's syndrome have female appearance with short stature, webbed neck, without ovaries and complete absence of germ cells.

20. Tumor: -

1. Tumor is a mass of unwanted cells that have been proliferated in uncontrolled fashion.
2. Tumors are clonal in origin, that is, they arise from a single cell.
3. They arise frequently, especially in older animals and humans.
4. Tumors are of two basic types:
 - a. Benign tumor---Small, localized with cells more or less normal having little deleterious effects
 - b. Malignant tumor---Invasive mass with less differentiated abnormal cells that multiply rapidly and undergo metastasis and spread to form new malignant tumors distant from the primary malignant tumor.

21. Karyokinesis Different from Cytokinesis: -

Karyokinesis	Cytokinesis
1. It is the division of nucleus.	1. It refers to division of whole cell.
2. Karyokinesis in plant and animal cells occurs in the same way.	2. It occurs in different way in plant and animal cells.
3. It is sub-divided into prophase, metaphase, anaphase and telophase.	3. It has no sub-stage.

GUJRANWALA BOARD QUESTIONS

1. What is a mitotic apparatus? (Gujranwala Board-2008-A)
2. What do you know about metastasis? (Gujranwala Board-2008-A)
3. Explain chromosomal non-disjunction. (Gujranwala Board-2008-A)
4. What are the symptoms of Turner's syndrome. (Gujranwala Board-2009-A)
5. How you can identify the cancer cells? (Gujranwala Board-2009-A)
6. What is metastasis? (Gujranwala Board-2010-A)
7. Explain necrosis? (Gujranwala Board-2010-A)

8. Define non-disjunction. (Gujranwala Board-2011-A)
9. What is necrosis? (Gujranwala Board-2011-A)
10. Define cell cycle. Draw a eukaryotic cell cycle. (Gujranwala Board-2012-A)
11. Give two importances of mitosis. (Gujranwala Board-2013-A)
12. Write at least three characters of cancer cells. (Gujranwala Board-2013-A)
13. Assign the sex of the human having XO, XXX, XXY and XYY chromosomes. (Gujranwala Board-2013-A)
14. What is mitotic apparatus? (Gujranwala Board-New Scheme-2014-A)
15. What is chromosomal non-disjunction? (Gujranwala Board-New Scheme-2014-A)
16. Define cell cycle. (Gujranwala Board-New Scheme-2014-A)
17. How do karyokinesis and cytokinesis phase of cell division differ? (Gujranwala Board-New Scheme-2014-A)
18. What changes occur in dividing cell during Diplotene? (Gujranwala Board-New Scheme-2014-A)
19. What is tetrad? (Gujranwala Board-New Scheme-2015-A)
20. Describe non-disjunction. (Gujranwala Board-New Scheme-2015-A)

Answers

1. Mitotic Apparatus: -

1. The asters, spindle, centrioles, and microtubules are collectively called mitotic apparatus. In plants mitotic apparatus consists of spindle and microtubules only.
Or
The term mitotic apparatus has been applied to the asters that surround the centrioles together with the mitotic spindle. In plants only spindle fibers form mitotic apparatus because centrioles are absent in the cell of higher plants.
2. Mitotic apparatus is designed to attach and capture chromosomes, aligning them and finally separating them so that equal distribution of chromosomes is ensured.
Or
It provides the framework for chromosome movement during cell division.

2. Metastasis: -

See Lahore Board Answer No: 2

3. Chromosomal Non-Disjunction: -

1. Chromosomal non-disjunction is the abnormality in

which chromosomes fail to segregate during anaphase and telophase and don't finish with equal distribution of chromosome among daughter nuclei.

2. Non-disjunction may occur during the first or second meiotic division or both. When it occurs during first meiotic division at anaphase I, homologous chromosomes fail to separate and when it occurs during second meiotic division at anaphase II, sister chromatids fail to segregate.

3. Non-disjunction leads to gametes with the gain or loss of a chromosome.

4. It can occur with the autosomes or with the sex chromosomes.

5. When an abnormal gamete unites with a normal, the resulting zygote has a chromosome abnormality with either an increase or decrease in the number of chromosomes causing serious physical, social and mental disorders.

4. Symptoms of Turner's Syndrome: -
The affected person is phenotypically female but is sterile, with under developed sex organs, small stature and characteristically webbed neck. Also the person tends to have lower than average non-verbal IQ.

5. Identification of Cancer Cells: -
See Exercise Chapter No: 21 Answer No: 2

6. Metastasis: -
See Lahore Board Answer No: 2

7. Necrosis: -
Necrosis is a cell death due to tissue injury in which the cell typically swells and bursts, releasing the intracellular contents, which can damage neighbouring cells and cause inflammation. Or Necrosis (meaning making dead) is uncontrolled cell death in which cells that die due to injury typically swell and burst, releasing their contents into the extracellular fluid causing inflammation and damage to other cells.

8. Non-Disjunction: -
See Exercise Chapter No: 21 Answer No: 5

9. Necrosis: -
See Gujranwala Board Answer No: 7

10. A) Cell Cycle: -
The events occurring from the completion of one division until the beginning of next division constitute cell cycle. Or The stages through which a cell passes from one cell division to the next are referred to as the cell cycle.

B) Diagram of Eukaryotic Cell: -
See Lahore Board Answer No: 5

11. Two Importances of Mitosis: -

1. Regeneration, healing of wounds and replacement of older cells are the gifts of mitosis.

2. Mitosis ensures the continuity of genetic information from parent to daughter cell as it distributes unchanged genetic material equally in daughter cells.

12. Three Characters of Cancer Cells: -

1. They are less differentiated than normal cells.
2. They exhibit the characteristics of rapidly growing cells, that is, high nucleus to cytoplasm ratio, prominent nucleoli and many mitosis and form tumors.
3. Cancer cells undergo metastasis and spread forming new tumors distant from the primary tumor.

13. Sex of the Human having XO, XXX, XXY and XYY Chromosomes: -

1. XO --- Female
2. XXX --- Female
3. XXY --- Male
4. XYY --- Male

14. Mitotic Apparatus: -
See Gujranwala Board Answer No: 1

15. Chromosomal Non-Disjunction: -
See Gujranwala Board Answer No: 3

16. Cell Cycle: -

1. The cell undergoes, a sequence of changes, which involves periods of growth, replication of DNA, followed by cell division. This sequence of changes is called cell cycle.
2. The cell cycle consists of two main phases, interphase and mitotic phase (M phase). M phase involves two main processes, mitosis and cytokinesis, while the interphase is divided into G₁ phase, S-phase and G₂-phase.
3. The cell cycle is repeated at each cell generation, but the length of the cycle varies considerably in different types of cells.
4. Cell cycle is a phenomenon by which cellular material is divided between daughter cells.

17. Karyokinesis Different from Cytokinesis: -
See Lahore Board Answer No: 21

18. Changes in Dividing Cell During Diplotene: -

1. At diplotene the paired chromosomes repel each other and begin to separate. However, this separation is not complete, because the homologous chromosomes remain united by their points of interchange, or chiasmata.
3. Chiasmata are generally regarded as the sites where the phenomenon of crossing over takes place. With few exceptions, chiasmata are found in all plants and animals. At least one chiasma is formed for each bivalent. Their number is variable. Some chromosomes have one chiasma and others have several.
4. During diplotene the four chromatids of the tetrad become visible.
5. During diplotene the synaptonemal complex starts disappearing.

19. Tetrad: -

1. Tetrad is a four stranded structure formed by coming together of homologous chromosomes in meiosis.
2. It is also known as bivalent.

20. Non-Disjunction: -

See Exercise Chapter No: 21 Answer No: 5

MULTAN BOARD QUESTIONS

1. Explain Apoptosis.
(Multan Board-2008-S)
2. What is Klinefelter's syndrome? Give its symptoms.
(Multan Board-2008-A)
3. What is the importance of Mitosis?
(Multan Board-2008-A)
4. In what respect cell death can be regarded beneficial?
(Multan Board-2008-S)
5. Why and how do the chromosomes get separated during anaphase of mitosis?
(Multan Board-2008-S)
6. What is Kinetochore?
(Multan Board-2009-A)
7. Differentiate between malignant and benign tumor.
(Multan Board-2009-A)
8. What are the symptoms of Turner's Syndrome?
(Multan Board-2009-A)
9. Define non-disjunction. Give examples.
(Multan Board-2009-S)
10. What changes occur in dividing cell during Diplotene?
(Multan Board-2009-S)
11. What is Metastasis?
(Multan Board-2010-A)
12. Give two significance happenings of Meiosis.
(Multan Board-2010-A)
13. What happens in G1 phase of Interphase?
(Multan Board-2010-S)
14. Why meiosis is so important?
(Multan Board-2010-S)
15. What is Apoptosis?
(Multan Board-2011-A)
16. Write about one Meiotic Error (Down's Syndrome).
(Multan Board-2011-A)
17. Characterize Pachytene stage of Meiosis.
(Multan Board-2011-S)
18. How Chromatin differs from Chromosomes?
(Multan Board-2011-S)
19. Give cause and symptoms of Down's syndrome.
(Multan Board-2012-A)

20. Define Mitotic Apparatus.
(Multan Board-2012-S)
21. Define Metastasis.
(Multan Board-2013-A)
22. How and when Phragmolast originates?
(Multan Board-2013-A)
23. Give the chances of occurrence of Down's Syndrome in teenage mother and a forty year old mother's offspring.
(Multan Board-2013-A)
24. How Cytokinesis takes place in plants?
(Multan Board-Old Scheme-2014-A)
25. What are Cytokinesis and Karyokinesis.
(Multan Board-New Scheme-2014-A)
26. What is Mitotic Apparatus?
(Multan Board-New Scheme-2014-A)
27. Define Metastasis.
(Multan Board-New Scheme-2015-A)
28. Differentiate between Apoptosis and Necrosis.
(Multan Board-New Scheme-2015-A)

Answers**1. Apoptosis: -**

Apoptosis (Greek word that means dropping off or falling off) is internal programme of events and sequence of morphological changes by which cell commits suicide. During this process the dying cells shrink and condense ultimately splits up, thus releasing small membrane bounded apoptic bodies, which are generally phagocytosed by other cells.

Or

1. The term apoptosis means dropping off in reference to dropping off of cells that are no longer useful.
2. Apoptosis is the intentional programmed cell death in which the cell signaled to commit suicide detaches itself from its neighbouring cells, then shrinks but its contents remain wrapped by plasma membrane forming apoptic body that is phagocytosed by other cells.
3. No inflammatory response is triggered, so no neighbouring cells are harmed.
4. Apoptosis is a normal part of development and maintenance.

2. A) Klinefelter's Syndrome: -

1. Klinefelter's syndrome occurs in one in about 1,500 births.
2. It results from a fusion of an XX egg and a normal Y sperm or a normal X egg and an XY sperm.
3. The affected individual has additional sex chromosome e.g., 47 chromosomes (44 + XXY).

B) Symptoms Klinefelter's Syndrome: -

The affected individuals are typically male, but have frequently enlarged breasts, tendency to tallness,

obesity, small testes with no sperms at ejaculation and under developed secondary sex characteristics.

3. Importance of Mitosis: -

1. In mitosis, the hereditary material is equally distributed in the daughter cell. As there is no crossing over or recombination, genetic material remains unchanged generation after generation, thus the continuity of similar information is ensured from parent to daughter cell.
2. Development and growth of multicellular organisms depends upon orderly controlled mitosis.
3. Tissue culture and cloning seek help through mitosis.
4. Regeneration, healing of wounds and replacements of older cells all are the gifts of mitosis.

5. With few exceptions, all kinds of asexual reproduction are carried out by mitosis.

4. Cell Death When Beneficial: -

Cell death can be regarded beneficial during multicellular development when:

1. Tail of the developing human embryo is deleted.
2. Tissue between developing digits is deleted.
3. Most of the neurons during development die.

5. Why and How Chromosomes Separated During Anaphase of Mitosis: -

1. Why: -

Chromosomes get separated during anaphase of mitosis to ensure equal distribution of chromatids in the daughter cells.

2. How: -

The kinetochore fibers of spindle contract towards their respective poles, at the same time polar microtubules elongate exert force and sister chromatids are separated. Or Sister chromatids are separated by the combined effect

of following two processes:

- a. Kinetochore fibers shorten by disassembly of kinetochore fibers of spindle, moving apart the kinetochores along with chromatids.
- b. Poles move further apart due to which polar microtubules elongate, exerting force to separate chromatids.

6. Kinetochore: -

1. It is a disc-shaped protein structure within the centromere to which spindle fibers attach during mitosis or meiosis. Or Kinetochore is a special area on the centromere with specific base arrangement and special proteins where kinetochore fibers of mitotic apparatus attach.
2. Kinetochore functions in chromosome distribution during mitosis.

7. Differences between Malignant and Benign Tumor:

Malignant Tumor	Benign Tumor
1. It is an invasive mass which can proliferate into	1. It is of small size and localized (not transferred

other malignant tumors away from its site of origin.

2. Cells in the malignant tumor are less differentiated and fail to perform normal function.

to other parts).

2. Cells in the benign tumor are more or less normal with little deleterious effects.

8. Symptoms of Turner's Syndrome: -

See Exercise Chapter No: 21 Answer No: 6

9. A) Non-Disjunction: -

The failure in the separation of the homologous chromosomes due to meiotic error is known as chromosomal non-disjunction or simply non-disjunction.

B) Examples: -

1. Down's syndrome ---Trisomy of chromosome 21, individuals with 47 chromosomes.
2. Klinefelter's syndrome ---Trisomy, individuals usually with 47 chromosomes having XXY.
3. Turner's syndrome ---- Monosomy for the X chromosome, individuals with 45 chromosomes having only one sex chromosome (X).

10. Changes in Dividing Cell During Diplotene: -

1. At diplotene the paired chromosomes repel each other and begin to separate. However, this separation is not complete, because the homologous chromosomes remain united by their points of interchange, or chiasmata.
2. During diplotene the four chromatids of the tetrad become visible.
3. During diplotene the synaptonemal complex starts disappearing.

11. Metastasis: -

1. Metastasis is a process by which cancer cells move from their point of origin to other locations in the body. Or Metastasis is the spread of cancer from the place of origin throughout the body.
2. During metastasis, rapidly growing metastatic cells invade the surrounding tissues, get into the body's circulatory system and set up areas of proliferation, away from their site of original appearance.

12. Two Significant Happenings of Meiosis: -

Two significant happenings of meiosis are:

- a. Crossing over
- b. Random assortment of chromosomes

a. Crossing Over: -

During crossing over, parental chromosomes exchange segments with each other which results in

large number of recombinations.

b. Random Assortment of Chromosomes: -

During anaphase of meiosis I homologous chromosomes separate and this separation is random which gives very wide range of variety of gametes. Or

1. The homologous chromosomes and their genes are randomly assorted between gametes producing a wide variety of gametes.

2. Crossing over involves a physical exchange of chromosome material between non-sister chromatids within a tetrad yielding recombinations, thus contributing a genetic diversity.

13. Happenings in G₁ Phase of Interphase: -

1. Cell increases in size.
2. Enzymes needed for DNA synthesis along with proteins required to initiate cell division are synthesized.
3. Synthesis of RNA occurs.
4. Cell accumulates materials (e.g. DNA base units) that will be used for DNA synthesis.

14. Importance of Meiosis: -

See Exercise Chapter No: 21 Answer No: 4

15. Apoptosis: -

See Multan Board Answer No: 1

16. Meiotic Error (Down's Syndrome): -

1. It is trisomy of chromosome 21.
2. The effected individual has 47 (2n + 1) chromosomes.
3. It occurs due to autosomal non-disjunction in 21st pair of chromosome.
4. This non-disjunction appears to occur in ova and is related to the age of mother. The chances of teenage mother having Down's syndrome child is one in many thousands, of forty years old mother, one in hundred chances and by forty five the risk is three times greater.
5. The affected individuals have flat, broad face, sequent eyes with the skin fold in corner, and protruding tongue, mental retardation, and defective development of central nervous system.

17. Characters of Pachytene Stage of Meiosis: -

1. Pairing of the chromosomes reaches completion.
2. The chromosomes become shorter and thicker due to longitudinal contraction and coiling.
3. The homologous chromosomes wrap around each other and each starts splitting into two sister chromatids by a longitudinal fission. Each unit is a bivalent or tetrad composed of two homologous chromosomes in close union and four chromatids.
4. Non-sister chromatids of homologous chromosomes exchange their segments due to chiasmata formation, during the process called crossing over. In this way reshuffling of genetic material occurs which produces recombinations.
5. Pachytene may last for days, weeks, or even years.

18. Chromatin Different From Chromosomes: -

Chromatin	Chromosomes
1. It is highly uncoiled and diffused complex of DNA and proteins of	1. Chromosomes are coiled and condensed structures of chromatin

which eukaryotic chromosomes are composed.

2. Chromatin appears as a network of granules, and strands in cells that are not dividing.
3. Chromatin is formed by a series of repeating units called nucleosomes.

and contain the genes.

2. They could be seen in dividing cells as distinct thread like structures after staining with dyes and are called chromosomes (colored bodies).
3. Each chromosome consists of two chromatids (each one of which contains a single DNA molecule) that are attached to each other by the centromere.

19. Cause and Symptoms of Down's Syndrome: -

See Lahore Board Answer No: 18

20. Mitotic Apparatus: -

See Gujranwala Board Answer No: 1

21. Metastasis: -

See Lahore Board Answer No: 2

22. How and When Phragmoplast Originates: -

1. How: --

Phragmoplast originates when Golgi apparatus produces Golgi vesicles, which move along the microtubule and fuse in the centre.

2. When: -

Golgi vesicles are produced during metaphase and are fused to form phragmoplast at the end of telophase.

23. The Chances of Occurrence of Down's Syndrome in Teenage Mother and a Forty Year Old

Mother's

Offspring:-

1. The chances of teenage mother having Down's syndrome offspring (child) is one in many thousands.
2. The chances of forty years old mother having Down's syndrome offspring is one in hundred.

24. Cytokinesis in Plants: -

See Lahore Board Answer No: 6

25. A) Cytokinesis: -

1. It is division of cytoplasm of a cell after nuclear division.
2. It is the splitting of the cytoplasm.
3. It occurs in different ways in animals and plants.

B) Karyokinesis: -

1. It involves the division of nucleus.
2. It can further be divided into prophase, metaphase, anaphase and telophase for thorough understanding though it is a continuous process.
3. It occurs in the same way in animals and plants.

26. Mitotic Apparatus: -

See Gujranwala Board Answer No: 1

27. Metastasis: -

See Multan Board Answer No: 11

28. Differences between Apoptosis and Necrosis: -

See Exercise Chapter No: 21 Answer No: 1

BAHAWALPUR BOARD QUESTIONS

1. Define cell cycle. (Bahawalpur Board-2008-A)
2. What is Malignant tumor?

- (Bahawalpur Board-2008-
A)
3. Give the importance of Meiosis.
(Bahawalpur Board-2009-
A)
4. Why Interphase is called Resting Phase?
(Bahawalpur Board-2009-
A)
5. Define cell cycle. (Bahawalpur Board-2010-
A)
6. How does cytokinesis in animal cells take place?
(Bahawalpur Board-2010-
A)
7. Sketch the Eukaryotic Cell Cycle.
(Bahawalpur Board-2011-
A)
8. Differentiate between Cancer Cell and Normal Cell.
(Bahawalpur Board-2011-
A)
9. What do you mean by Metastasis?
(Bahawalpur Board-2012-
A)
10. Characterize Zygotene Stage of Meiosis.
(Bahawalpur Board-2013-
A)
11. What do you know about Turner's Syndrome?
(Bahawalpur Board-2013-
A)
12. Give the importance of Meiosis.
(Bahawalpur Board-New Scheme-2014-
A)
13. Why interphase is called Resting Phase?
(Bahawalpur Board-New Scheme-2014-
A)
14. What is Metastasis?
(Bahawalpur Board-New Scheme-2015-
A)
15. Highlight the importance of Meiosis.
(Bahawalpur Board-New Scheme-2015-
A)

Answers

1. **Cell Cycle:** -
See Gujranwal Board Answer No: 16
2. **Malignant Tumor:** -
1. Malignant tumor is a large invasive mass of transformed (mutant) cells.
2. It is also known as cancer.
3. Cells comprising malignant tumor divide more rapidly, mostly invade surrounding tissues, get into the body's circulatory system and set up areas of proliferation away from their site of original appearance.
3. **Importance of Meiosis:** -
See Exercise Chapter No: 21 Answer No: 4
4. **Interphase Called Resting Phase:** -
Interphase is misleadingly called resting phase. Actually it is a period of intense biosynthetic activity in which the cell doubles in size and duplicates precisely its chromosome complement.
5. **Cell Cycle:** -
See Gujranwala Board Answer No: 16

6. Cytokinesis in Animal Cells: -

In animal cells, during late telophase the astral microtubules send signals to the equatorial region of the cell where actin and myosin are activated which form contractile ring, followed by cleavage furrow, which deepens toward the centre of the cell dividing the parent cell into two daughter cells. Or

1. Cytokinesis of animal cell begins when a ring of contractile microfilaments (actin and myosin microfilaments) associated with plasma membrane is formed. This contractile ring encircles the cell in the equatorial region, at right angle to the spindle.
2. The contractile ring then contracts, producing a cleavage furrow that gradually deepens and separates the cytoplasm into two daughter cells, each with a complete nucleus.

7. Sketch of Eukaryotic Cell Cycle: -

See Lahore Board Answer No: 5

8. Differences Between Cancer Cell and Normal Cell:

Cancer Cells	Normal Cells
1. Cancer cells typically remain immature and do not become specialized.	1. They are well differentiated and specialized cells.
2. They do not contribute to the functioning of a body part.	2. They perform normal functions according to the type of tissue.
3. They have large nuclei and prominent nucleoli and exhibit uncontrolled cell division.	3. They have normal nucleus and nucleoli, and exhibit controlled cell division.
4. They have three to twenty mutant genes that regulate cell division.	4. They have normal genes for regulation of cell division.
5. They do not adhere well to the neighbouring normal cells and undergo metastasis and spread forming new cancer cells distant from their primary location.	5. Normal cells adhere to their neighbouring cells and never invade other tissues.

9. Metastasis: -

See Lahore Board Answer No: 2

10. Characters of Zygotene Stage of Meiosis: -

1. The homologous chromosomes undergo pairing in a process called synapsis of the chromosomes.
2. This pairing is highly specific and involves in the formation of a special structure that can be observed under electron microscope and is called the synaptonemal complex (SC).
3. The two homologues do not fuse during pairing and form a structure known as bivalent or tetrad.

11. Turner's Syndrome: -

When X chromosomes fail to separate during meiosis, two types of gametes are formed. Some gametes have two X chromosomes i.e. XX while other gametes have no sex (X) chromosome and are designated O. When an O gamete fuses with normal X gamete, the XO

zygote develops into a sterile female of short stature, with a webbed neck and sex organs that never fully mature during puberty. This condition is called Turner's syndrome.

12. Importance of Meiosis: -

See Exercise Chapter No: 21 Answer No: 4

13. Interphase Called Resting Phase: -

See Bahawalpur Board Answer No: 4

14. Metastasis: -

See Lahore Board Answer No: 2

15. Importance of Meiosis: -

See Exercise Chapter No: 21 Answer No: 4

FAISALABAD BOARD QUESTIONS

- What is non disjunction of chromosomes?
(Faisalabad Board-2008-A)
- Write G_1 and changes which occur during this phase in the cell.
(Faisalabad Board-2008-A)
- Define Cancer.
(Faisalabad Board-2009-A)
- Define Bivalent or Tetrad.
(Faisalabad Board-2009-A)
- What is non disjunction?
(Faisalabad Board-2010-A)
- How benign differ from malignant tumor?
(Faisalabad Board-2010-A)
- Write about the stage of telophase in mitosis.
(Faisalabad Board-2011-A)
- Distinguish between karyokinesis and cytokinesis.
(Faisalabad Board-2011-A)
- What change in cell takeplace during diplotene?
(Faisalabad Board-2012-A)
- How cytokinesis occurs in plants?
(Faisalabad Board-2013-A)
- What do you know about Turner's syndrome?
(Faisalabad Board-2013-A)
- What events occure in anaphase of mitosis.
(Faisalabad Board-2013-A)
- Compare karyokinesis with cytokinesis.
(Faisalabad Board-Old Scheme-2014-A)
- What is mitotic apparatus?
(Faisalabad Board-Old Scheme-2014-A)
- What is chromosomal non disjunction?
(Faisalabad Board-Old Scheme-2014-A)
- Define cell cycle.
(Faisalabad Board-Old Scheme-2014-A)
- Give symptoms of Turner's syndrome.
(Faisalabad Board-New Scheme-2015-A)
- Differentiate between diplotene and diakinesis.

(Faisalabad Board-New Scheme-2015-

A)

Answers

1. Non Disjunction of Chromosomes: -

See Gujranwala Board Answer No: 3

2. A) G_1 Phase: -

- G_1 (G_1 , G stands for gap, an interval during which no DNA synthesis occurs) is the time between the end

of mitosis and beginning of the S phase.

- It is typically a longest phase.

B) Changes During G_1 Phase: -

- Cell normally grows in size.
- Specific enzymes are synthesized.
- DNA base units are accumulated for the synthesis of DNA.

3. Cancer: -

Cancer is a malignant tumor, the cells of which are non-specialized, undifferentiated with enlarged nuclei

and many mitosis that undergo uncontrolled cell division, metastasis and spread forming new tumors distant from the primary tumor.

4. Bivalent or Tetrad: -

Bivalent is a pair of homologous chromosomes, each

having two sister chromatids, that are joined by a nucleoprotein lattice during meiosis. It is also called tetrad. Or

Tetrad is the chromosomal complex formed by the synapsis of a pair homologous chromosomes (i.e.

four chromatids) during meiotic prophase I. It is also known as bivalent. Or

Bivalent or tetrad is a four stranded structure formed by coming together of homologous chromosomes in meiosis.

5. Non Disjunction: -

See Gujranwala Board Answer No: 3

6. Benign Tumor Different From Malignant Tumor: -

See Multan Board Answer No: 7

7. Telophase in Mitosis: -

- The chromosomes condense due to unfolding, ultimately disappear as chromatin.
- Mitotic apparatus disorganizes.
- Nuclear membrane and nucleoli reorganize, resulting

two daughter nuclei at two poles of the cell. Or

- Telophase is characterized by the arrival of the chromosomes at the poles.
- The chromosome uncoil to their decondensed chromatin form.
- The spindle microtubules disappear.
- A new nuclear envelope forms around each set of chromosomes.
- Nucleoli reform and become conspicuous.

8. Difference Between Karyokinesis and Cytokinesis:

See Lahore Board Answer No: 21

9. Change In Cell During Diplotene: -

See Multan Board Answer No: 10

10. Cytokinesis in Plants: -

- In plant cells, cytokinesis starts with the formation of
fragmoplasts, which comprises the microtubules and Golgi vesicles. Golgi apparatus produces vesicles during metaphase which move along the microtubules in the centre of dividing cells where they fuse to form
fragmoplast at the end of telophase. The vesicle membranes fuse to become the plasma membrane of each daughter cell.
- Phragmoplast is then transformed into cell plate separating daughter cells.
- Within the cell plate middle lamella and primary cell wall is produced from the contents contained in Golgi vesicles.

11. Turner's Syndrome: -

See Lahore Board Answer No: 19

12. Events Occurring in Anaphase of Mitosis: -

During anaphase sister chromatids separate and travel towards each pole. Their separation is achieved by following two events:

- Kinetochore microtubules shorten separating sister chromatids to opposite poles.
- Polar microtubules elongate due to which lengthening of spindle occurs that pushes its ends further apart with the result sister chromatids are pulled further apart.

14. Comparison of Karyokinesis with Cytokinesis: -

See Lahore Board Answer No: 21

15. Mitotic Apparatus: -

See Gujranwala Board Answer No: 1

16. Chromosomal Non Disjunction: -

See Gujranwala Board Answer No: 3

17. Cell Cycle: -

See Gujranwala Board Answer No: 16

18. Symptoms of Turner's syndrome: -

- Female appearance with short stature
- Webbed neck
- Absence of ovaries
- Complete absence of germ cells

19. Differences between Diplotene and Diakinesis: -

Diplotene	Diakinesis
1. Homologous chromosomes start to separate.	1. Separation of homologous chromosomes is completed.
2. Homologous chromosomes remain united by their point of interchange (chiasmata).	2. Homologous chromosomes are still united at one point, more often at ends.
3. Nucleoli are present.	3. Nucleoli disappear.
4. Nuclear envelope is still present.	4. Nuclear envelope starts fragmenting.

RAWALPINDI BOARD QUESTIONS

- Define Necrosis. (Rawalpindi Board-2010-A)
- What are apparent symptoms of Down's syndrome? (Rawalpindi Board-2010-A)
- How cytokinesis takes place in a plant cell?

(Rawalpindi Board-2011-A)

- Define non-disjunction of chromosomes. (Rawalpindi Board-2011-A)

(Rawalpindi Board-2011-A)

- How does cytokinesis occur in plants? (Rawalpindi Board-2012-A)

(Rawalpindi Board-2012-A)

- What is G₁ phase? What does happen in this phase? (Rawalpindi Board-2013-A)

(Rawalpindi Board-2013-A)

- What is equatorial plate? How is it formed in mitosis? (Rawalpindi Board-2013-A)

(Rawalpindi Board-2013-A)

- How cytokinesis takes place in plants? (Rawalpindi Board-New Pattern-2014-A)

(Rawalpindi Board-New Pattern-2014-A)

- Write down characteristics of cancer cells. (Rawalpindi Board-New Pattern-2014-A)

(Rawalpindi Board-New Pattern-2014-A)

- What events occur in anaphase of mitosis? (Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

- What do you know by Turner's syndrome? (Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

- How Cytokinesis occurs in plants? (Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

(Rawalpindi Board-New Pattern-2015-A)

3. As a result of above two events, two sets (two halves) of sister chromatids travel towards the opposite poles of the spindle.

11. Turner's syndrome: -

See Lahore Board Answer No: 19

12. Cytokinesis in Plants: -

See Lahore Board Answer No: 6

SARGODHA BOARD QUESTIONS

1. Explain malignant tumor. (Sargodha Board-2010-A)
2. Differentiate between necrosis and apoptosis. (Sargodha Board-2010-A)
3. What events occur in Anaphase-I in meiosis? (Sargodha Board-2011-A)
4. What are the symptoms of Down's syndrome? (Sargodha Board-2011-A)
5. Differentiate between necrosis and apoptosis. (Sargodha Board-2012-A)
6. Give the change which occurs during anaphase of mitosis. (Sargodha Board-2013-A)
7. Give symptoms of Klinefelter's syndrome. (Sargodha Board-2013-A)
8. Define meiosis. (Sargodha Board-2013-A)
9. What is metastasis? (Sargodha Board-New Scheme-2014-A)
10. What is the importance of Mitosis? (Sargodha Board-New Scheme-2014-A)

Answers

1. Malignant Tumor: -

See Bahawalpur Board Answer No: 2

2. Differences Between Necrosis and Apoptosis: -

See Exercise Chapter No: 21 Answer No: 1

3. Events in Anaphase I in Meiosis: -

1. The kinetochore fibers contract and the spindle or pole fibers elongate pulling the individual chromosome.
2. The sister chromatids of each homologues, united by the kinetochore, move toward their respective poles.
3. When the homologous paternal and maternal chromosomes separate in anaphase I, two of their chromatids are mixed while other two maintain their initial nature.

4. Symptoms of Down's Syndrome: -

See Lahore Board Answer No: 18 (4)

5. Differences Between Necrosis and Apoptosis: -

See Exercise Chapter No: 21 Answer No: 1

6. Change Occurring During Anaphase of Mitosis: -

See Faisalabad Board Answer No: 12

7. Symptoms of Klinefelter's Syndrome:

See Multan Board answer No: 2

8. Meiosis: -

1. Meiosis is a process of cell division in which the number of chromosomes in certain cells is halved during gamete formation.

Or

It is a division process occurring during gamete formation that reduces the number of each chromosome in each daughter cell to one half.

Or

Meiosis is a process in which diploid nucleus divides into four haploid, genetically different nuclei

2. Meiosis occurs in sexual reproduction.
3. It halves the number of chromosomes from diploid to haploid.
4. It occurs in diploid nucleus, involves two divisions, and produces four genetically different daughter haploid nuclei.
5. In animals, meiosis results in the production of gametes. In plants, meiosis results in production of spore. In haploid organisms such as fungi, it occurs after fertilization.

9. Metastasis: -

See Lahore Board Answer No: 2

10. Importance of Mitosis: -

1. In mitosis, each daughter cell receives a complete set of chromosomes identical to that of the parent cell, hence mitosis ensures the continuity of the genetic information unchanged from parent cell to daughter cells.
2. It provides means for the animals and plants to develop from zygote to adult and further growth during life.
3. With few exceptions, all kinds of asexual reproduction are carried out by mitosis.
4. Vegetative propagation in plants is also based upon mitotic activity of the vegetative parts.
5. Tissue culture and cloning are also carried out by mitosis.

DERA GHAZI KHAN BOARD QUESTIONS

1. Define Kinetochore. (D.G.K. Board-2009-A)
2. Differentiate between benign and metastasis. (D.G.K. Board-2009-A)
3. What is interphase? Name its sub-phases. (D.G.K. Board-2010-A)
4. Define homologous chromosomes. (D.G.K. Board-2010-A)
5. Define meiosis. (D.G.K. Board-2011-A)
6. What is Turner's syndrome? (D.G.K. Board-2011-A)
7. Define cell cycle. Give its two phases. (D.G.K. Board-Group-I-2012-A)
8. How cancer cells are different from normal cells?

- (D.G.K. Board-Group-II-2012-
A)
9. State briefly the importance of mitosis.
(D.G.K. Board-Group-I-2013-
A)
10. What do you know about mongolism?
(D.G.K. Board-Group-I-2013-
A)
11. Characterize leptotene stage of meiosis.
(D.G.K. Board-Group-I-2013-
A)
12. Write about metastasis.
(D.G.K. Board-Group-II-2013-
A)
13. What changes occur in dividing cell during
zygotene?
(D.G.K. Board-Group-II-2013-
A)
14. Give only cause of Down's syndrome and Kline
felter
syndrome. (D.G.K. Board-Group-II-2013-
A)
15. What are symptoms of Turner's syndrome?
(D.G.K Board-New Scheme-Group-I-2014-
A)
16. How cytokinesis differ in plant and animal cells?
(D.G.K Board-New Scheme-Group-I-2014-
A)
17. Differentiate between malignant and benign tumor.
(D.G.K Board-New Scheme-Group-I-2014-
A)
18. What are three sets of microtubules which originate
from each pair of centriole during mitosis.
(D.G.K Board-New Scheme-Group-II-2014-
A)
19. What is kinetochore?
(D.G.K Board-New Scheme-Group-I-2015-
A)
20. What do you know about Turner's syndrome?
(D.G.K Board-New Scheme-Group-I-2015-
A)
21. Define crossing over.
(D.G.K Board-New Scheme-Group-II-2015-
A)
22. What is mitotic apparatus and its role during cell
division?
(D.G.K Board-New Scheme-Group-II-2015-
A)

Answers

1. Kinetochore: -

- Kinetochore is a disk of protein bound to the centromere and attached to microtubules during mitosis, linking each chromatid to the spindle. Or
1. Under electron microscope kinetochore appears as
a plate or cup like disc situated upon the primary constriction or centromere.
2. It is a structure formed from proteins.
3. A centromere consists of two protein discs, kinetochores.
4. It is a structure into which are inserted microtubules called kinetochore microtubules.
5. It links each chromatid or each homologue to the

spindle.

2. Differences Between Benign and Malignant Tumor: -

See Multan Board Answer No: 7

3. A) Interphase: -

1. It is the phase of cell cycle in between divisions.
Or

It is the period between two mitotic or meiotic divisions in which a cell grows and its DNA replicates.

2. It occupies far the greater part of cell cycle.

B) Names of Sub-phases of Interphase: -

1. G₁ (Gap 1) phase
2. S (Synthesis) phase
3. G₂ (Pre-mitotic) phase

4. Homologous Chromosomes: -

1. Homologous chromosome is a pair of corresponding chromosomes of the same shape and size, one from each parent. Two copies of a chromosome that are similar but not identical to each other are called homologous chromosomes. Or
Homologous chromosomes are two chromosomes

that

are similar in morphology and genetic constitution.

1. Homologous chromosomes are a pair of chromosomes that carry equivalent genes.
2. One of a pair of homologous chromosomes is called homologue.
3. One member of each pair is inherited from mother or female parent (via the egg), and other from the father or male parent (via sperm).
4. In humans there are twenty three pairs of homologous chromosomes.

5. Meiosis: -

See Sargodha Board Answer No: 8

6. Turner's Syndrome: -

See Lahore Board Answer No: 19

7. A) Cell Cycle: -

The cell undergoes a sequence of changes, which involves period of growth, replication of DNA, followed by cell division. Each round of growth,

DNA

replication and cell-division is called a cell cycle.

B) Two Phases of Cell Cycle: -

The cell cycle consists of two main phases:

a. Interphase: -

It is a period of cell cycle between two consecutive divisions. It is divided into G₁ phase, S-phase and

G₂-

phase.

b. Mitotic (M) phase: -

It is the next phase of cell cycle in which mature cell splits into two daughter cells. It involves two main processes, mitosis and cytokinesis.

8. Cancer Cells Different from Normal Cells: -

See Bahawalpur Board Answer No: 8

9. Importance of Mitosis: -

See Multan Board Answer No: 3

10. Mongolism: -

See Lahore Board Answer No: 1

11. Characters of Leptotene Stage of Meiosis:-

See Multan Board Answer No: 10

12. Metastasis:-

See Lahore Board Answer No: 2

13. Changes in Dividing Cell During Zygotene:-

See Bahawalpur Board Answer No: 10

14. A) Cause of Down's Syndrome:-

See Lahore Board Answer No: 18 (A)

B) Cause of Klinefelter Syndrome:-

It results from a fusion of an XX egg and a normal Y sperm or a normal X egg and an XY sperm. Thus the affected individual has additional sex chromosome e.g., 47 chromosomes (44 + XXY)

15. Symptoms of Turner's Syndrome:-

See Exercise Chapter No: 21 Answer No: 6

16. Cytokinesis Different in Plant and Animal Cells:-

Cytokinesis in Plant Cells	Cytokinesis in Animal Cells
1. Cytoplasm in plant cells is divided by the formation of phragmoplast followed by cell plate and the cell wall.	1. Cytoplasm in animal cells is divided by contractile ring followed by cleavage furrow.
2. Constituents of phragmoplast are Golgi vesicles and microtubules.	2. Constituents of contractile ring are actin and myosin.
3. Division proceeds from centre to periphery.	3. Division proceeds from periphery to centre.

17. Differences Between Malignant and Benign Tumor:-

See Multan Board Answer No: 7

18. Three Sets of Microtubules Originating from Each**Pair of Centriole During Mitosis:-**

Three sets of microtubules (fibers) originate from each pair of centrioles.

1. Asters microtubules radiate from outward and form aster.
2. Polar microtubules extend from each pole to the equatorial region where they generally overlap.
2. Kinetochore microtubules, also called chromosomal spindle fibers, extend from each pole and attach to the kinetochores.

19. Kinetochore:-

See D.G.K. Board Answer No: 1

20. Turner's Syndrome:-

See Lahore Board Answer No: 19

21. Crossing Over:-

1. It is an exchange of segments between non-sister chromatids of homologous chromosomes during meiosis.
2. It occurs in pachytene stage of prophase I of meiosis I.
3. In crossing over, recombination of genetic material occurs which produces recombinations.

22. A) Mitotic Apparatus:-

1. In animal cell, the specialized microtubular structure

including centrioles aster and spindle is called mitotic

apparatus. In plants, mitotic apparatus consists of spindle and microtubules only.

2. It is larger than the nucleus.

B) Role of Mitotic Apparatus During Cell Division:-

Mitotic apparatus is designed to attach and capture chromosomes, aligning them and finally separating them so that equal distribution of chromosomes is ensured.

Or

It provides the framework for chromosome movement during cell division.

SAHIWAL BOARD QUESTIONS

1. What are the importance of mitosis?
(Sahiwal Board-2013-
A)
2. What are the symptoms of Dawn's Syndrome?
(Sahiwal Board-2013-
A)
3. Explain diplotene stage in prophase-I of meiosis.
(Sahiwal Board-2013-
A)
4. What is malignant tumor?
(Sahiwal Board-Old Scheme-2014-
A)
5. Define non-disjunction and give one autosomal example.
(Sahiwal Board-New Scheme-2014-
A)
6. Give length of cell cycle during mitosis in human cell.
(Sahiwal Board-New Scheme-2014-
A)
7. Draw and label cell cycle.
(Sahiwal Board-New Scheme-2015-
A)
8. Name only stages of prophase I of meiosis.
(Sahiwal Board-New Scheme-2015-
A)

Answers**1. Importance of Mitosis:-**

See Multan Board Answer No: 3

2. Symptoms of Dawn's Syndrome:-

See Lahore Board Answer No: 18 (B)

3. Diplotene Stage in Prophase-I of Meiosis:-

See Gujranwala Board Answer No: 18

4. Malignant Tumor:-

See Bahawalpur Board Answer No: 2

5. A) Non-Disjunction:-

See Exercise Chapter No: 21 Answer No: 5

B) Autosomal Example of Non-Disjunction:-

Down's syndrome is the most common autosomal non-disjunction that occurs in 21st pair of chromosome. The affected individual has flat, broad face, squint eyes with the skin fold in the inner corner,

and protruding tongue, mental retardation and defective development of nervous system.

6. Length of Cell Cycle During Mitosis in Human Cell:-

In human cell, average cell cycle is about 24 hours long, mitosis takes 20 minutes, G₁ 9 hours, the S-phase 10 hours, and G₂ 4.5 hours.

7. Label diagram of Cell Cycle: -

See Lahore Board Answer No: 5

8. Name of Stages of Prophase I of Meiosis: -

1. Leptotene
2. Zygotene
3. Pachytene
4. Diplotene
5. Diakinesis

C h a p t e r ----

22

VARIATION AND GENETICS

3 SQs

I) From Exercise:-**Questions**

1. Differentiate between:
 - a. Phenotype and genotype
 - b. Homozygous and heterozygous
 - c. Autosome and sex chromosome
 - d. Allele and multiple allele
 - e. Incomplete dominance and complete dominance
 - f. Continuous and discontinuous variations
 - g. Gene and allele
 - h. Monohybrid and dihybrid
 - i. Dominance and epistasis
 - j. X-linked trait and Y-linked trait
 - k. Sex limited and sex influenced trait
 - l. Dominant trait and recessive trait
 - m. Wild type and mutant
2. What is a gene pool?
3. Was a pea lucky choice for Mendel? What would have happened if he had studied an eighth character?
4. What is test cross? Why did Mendel device this cross?
5. What would happen if alleles of a pair do not segregate at meiosis? How would it effect the purity of gamete?
6. If the allele do not assort independently, which type of combination is missing in the progeny?
7. Why has each gamete equal chance of getting one or the other allele of a pair?
8. Does the dominant allele modify the determinative nature of its recessive partner? What sort of relationship do they have?
9. Which type of traits can assort independently?
10. Why does the blood genotype of a person remain constant throughout life?
11. What is a universal blood donor? ▲
12. How can you protect the baby against Rh-incompatibility?
13. What is multifactorial inheritance?
14. What is MODY?

15. Can a child have more intelligence (IQ score) than his parents?

Answers**1. Differences between Phenotype and Genotype: -**

Phenotype	Genotype
1. It refers to the physical appearance of a trait.	1. It is genetic make up of a trait.
2. It is the visible expression or outcome of genotype.	2. It is the genetic information inherited by organism in the form of genes or alleles for a particular trait or traits.
3. Tallness is the phenotype of a pea plant.	3. TT or homozygous tall or Tt or heterozygous tall is the genotype of tall pea plant.

b. Differences between Homozygous and Heterozygous: -

Homozygous	Heterozygous
1. Having a pair of identical alleles for a particular locus is called homozygous.	1. Having a pair of unlike alleles for a particular locus is called heterozygous.
2. RR or rr is a homozygous condition because two alleles for seed shape are similar. In RR condition both the alleles are of round shape while in rr condition both alleles are of wrinkled shape.	2. Rr is a heterozygous condition because two alleles of gene pair for seed shape are different from each other, one is allele for round shape and other is allele for wrinkled shape.
4. An individual with a homozygous genotype is a homozygote.	3. An individual with a heterozygous genotype is a heterozygote.

c. Differences between Autosome and Sex Chromosome:-

Autosome	Sex Chromosome
1. An autosome is a chromosome that is not concerned with the determination of sex.	1. Chromosome that determines the sex of an individual is called sex chromosome.
2. Any eukaryotic chromosome that is not a sex chromosome is autosome.	2. Usually a pair of chromosome is sex chromosome.
3. Autosomes are present in the same number and kind (morphology) in both males and females of the species.	3. Sex chromosomes differ in morphology, and are present in different numbers in males and females.

d. Differences between Allele and Multiple Allele: -

Allele	Multiple Allele
1. Two alternative forms of a gene occupying a single locus are known as alleles.	1. Three or more (more than two) forms of a gene occupying a single locus are known as multiple alleles.
2. Alleles occupy corresponding loci on homologous chromosomes, they are	2. Multiple alleles also occupy corresponding loci on homologous

never present on the same chromosome. 2. The height of a pea plant is determined by two alleles, T and t. T is responsible for tallness while t for dwarfness.	chromosomes, but only of them are present in an individual and the rest are present in the population. 2. A well known example of multiple alleles in human being is that of ABO blood group. ABO blood group is determined by three alleles I^A , I^B and i. The I^A allele is responsible for the production of the A antigen, I^B the B antigen and the i allele produces neither.
---	--

e. Differences between Incomplete Dominance and Co-dominance:

Incomplete Dominance	Co-dominance
1. Incomplete dominance is the condition in which neither allele on a locus is completely dominant over the other, with the result that heterozygotes are intermediates between the two homozygotes. 2. Red and white colors of flowers in Japanese four-o'clock plants (<i>Mirabilis jalapa</i>) are determined by alleles R_1 and R_2 respectively. When both these alleles are together (R_1R_2) in a heterozygote, a pink flower (intermediate between red and white) is produced.	1. Co-dominance is a condition in which two different alleles of a particular gene on a locus are expressed together in a heterozygote. 2. In case of MN blood group, the allele L^M produces M antigen on RBC and L^N produces N antigen. When both these alleles are together (L^M and L^N) in a heterozygote, both M and N antigens are produced.

f. Differences between Continuous and Discontinuous Variations: -

Continuous Variations	Discontinuous Variations
1. Continuous variations are those in which there is a continuous series of intermediates between two extremes, so organisms can not be placed in discrete groups. 2. These are the variations in which characters can be measured. 3. They are also called quantitative variations. 4. They are controlled by many genes. 5. They may be influenced by environmental factors.	1. These variations take the form of distinct, alternative phenotypes with no intermediates and the organisms can be classified in discrete groups. 2. They can not be measured. 3. They are also called qualitative variations. 4. These variations are under the control of a single pair of alleles or a small number of genes. 5. Discontinuous variations can not usually be altered by the environment.

g. Differences between Gene and Allele: -

Genes	Alleles
-------	---------

1. Genes are distinct units of hereditary material found in chromosomes, each gene has a particular nucleotide sequence encoding a particular polypeptide chain. 2. Genes usually exist in pairs, however, some have more than two members. Genes may or may not be present on the same chromosome occupying different loci (position of a gene on chromosome).	1. Alleles are also the genes but represent variants of a particular gene. 2. Alleles are usually two (in some cases three or more) partners of a gene controlling a same character. Alleles occupy corresponding loci on homologous chromosomes, they are never present on the same chromosome.
--	---

h. Differences between Monohybrid and Dihybrid: -

Monohybrid	Dihybrid
1. The individual that is heterozygous for one particular trait is called monohybrid. 2. It is the offspring produced by cross-fertilization between two organisms differing in two characters (traits).	1. The individual that is heterozygous for two traits is called dihybrid. 2. It is the offspring produced by cross-fertilization between organisms differing in four characters (i.e. in one contrasting pair of traits).

i. Differences between Dominance and Epistasis: -

Dominance	Epistasis
1. It is the relationship between alleles of the same gene occupying the same locus. 2. The allele controlling tallness of a pea plant (i.e. T) always masks the expression of allele for dwarfness (i.e. t) when both are present in a heterozygote.	1. It is the interaction between two different genes occupying different loci. 2. The allele pair hh masks the expression of alleles I^A and I^B . hh genotype does not produce sugar necessary for the attachment of antigens A and B on RBC produced by I^A and I^B respectively, hence alleles I^A or I^B or both are not phenotypically expressed.

j. Differences between X-linked Trait and Y-linked Trait: -

X-linked Trait	Y-linked Trait
1. It is the trait whose gene is present on X chromosome. 2. It zigzags from maternal grandfather through a carrier daughter to a grandson. It never passes direct from father to son because a son inherits only Y chromosome from father. 3. Hemophilia and color blindness are two examples of X-linked trait.	1. It is a trait whose gene is present on Y chromosome. 2. Y-linked traits are passed from father to son and are never observed in females. 3. Maleness in man is a Y-linked trait which is determined by SRY gene on Y chromosome.

k. Differences between Sex limited and Sex Influenced Trait: -

Sex Limited Trait	Sex Influenced Trait
1. It is genetic trait that is limited to only one sex due to anatomical differences. 2. These traits may be controlled by sex-linked or autosomal genes. 3. For example, beard growth in humans is limited to men. A woman does not grow a beard itself but she can pass the genes specifying heavy beard growth to her sons.	1. It is a genetic trait that is expressed differentially in males and females. 2. It is controlled by an allele that is expressed as dominant in one sex but recessive in other. 3. For example, pattern baldness is a sex-influenced trait. Many more men than women are bald. It is inherited as an autosomal dominant trait in males but as an autosomal recessive trait in females. A heterozygous male is bald but a heterozygous female is not. A woman can be bald only when she is homozygous recessive.

1. Differences between Dominant Trait and Recessive Trait: -

Dominant Trait	Recessive Trait
1. It is a trait (characteristic) that is expressed in heterozygotes. 2. Following seven traits of garden pea studied by Mendel are dominant: Tallness, purple color of flower, axial flower position, green color of pod, inflated shape of pod, yellow color of seed and round shape of seed.	1. It is trait (characteristic) that is only expressed in homozygotes. 2. Following seven traits of garden pea studied by Mendel are recessive: Dwarfness of pea plant, white color of flower, terminal flower position, yellow color of pod, constricted shape of pod, green color of seed and wrinkled shape of seed.

m. Differences between Wild type and Mutant: -

Wild Type	Mutant
1. Wild type is phenotypically normal, naturally occurring, form of a gene or organism. 2. This phenotype or genotype is characteristic of the majority of individuals of a species in a natural selection. 3. Wild type <i>Drosophila</i> fly has a long wings, red eyes and a gray body.	1. A mutated gene is known as mutant. An organism that carries a gene that has undergone a mutation is also called mutant. 2. Mutant is one that differs strikingly from normal genotype or phenotype of the same species. 3. Mutant <i>Drosophila</i> fly has short (vestigial) wings, white eyes, and black body.

2. Gene Pool: -

- All the genes/alleles found in a breeding population at a given time are called the gene pool.
- It is the total genetic information encoded in the total

genes in a breeding population existing at a given time.

- Alleles are like beans in a bean bag. The entire bean bag full of beans is the gene pool of the population.
- A sample population of 100 diploid plants, some of which bear red flowers while others bearing white flowers, has a sum total of 200 of all different alleles (R or r) for flower color trait as its gene pool.
- A) Pea as Lucky Choice for Mendel: -**
Yes, Pea was a lucky choice for Mendel. Pea has seven pairs of homologous chromosomes. Mendel knew nothing about chromosomes. The traits he studied were confined to only four chromosomes.

He reported independent assortment of those traits whose genes were either on different homologous, or were so far away from each other on the same chromosome that appeared to assort independently due to crossing over.

B) Happening if Mendel had Studied an Eighth Character: -

If Mendel had studied eighth character whose alleles would have linked close to alleles of one of the seven characters and would not assort independently.

4. A) Test Cross: -

- Test cross is a mating in which an individual showing a dominant genotype is crossed with an individual showing its recessive phenotype.
- Test cross finds out the homozygous or heterozygous nature of the genotype.

B) Why Mendel Devised Test Cross: -

Mendel devised the test cross to test the genotype of an individual showing a dominant phenotype and established true-breeding lines or varieties for each trait.

5. A) If Segregation Would Not Occur: -

If alleles of a pair do not segregate at meiosis, it would lead to abnormal separation of alleles in gametes. Some gametes would have both alleles, other would have neither of both.

B) Effect On Purity of Gamete: -

It would disturb the purity of gamete according to which each gamete receives only one of two alleles.

6. Type of Combination Missing If the Allele Do Not

Assort Independently: -

If the alleles do not assort independently, recombinant individual is missing in the progeny.

7. Why Each Gamete Has Equal Chance of Getting One or the Other Allele of a Pair: -

Each gamete has equal chance of getting one or the other allele of a pair because of random separation of

chromosomes, hence alleles at meiosis.

8. Is Nature of Recessive Gene Modified:

No, the dominant allele does not modify the nature of its recessive partner. It just masks the expression of recessive gene in its presence. The recessive expresses itself equally well in homozygous condition.

9. The Type of Traits That Can Assort Independently: -

Those traits can assort independently whose alleles are residing non-homologous chromosomes.

10. Blood Genotype of a Person Remains Constant Throughout Life: -

Blood group phenotype of a person remains constant because alleles controlling blood group start their expression at early embryonic stage and keep on expressing themselves till death.

11. Universal Blood Donor: -

Blood group O are used as donor for O recipient exclusively. It can also be used as donor for small transfusions to A, B and AB recipients because donor's antibodies are quickly absorbed by other tissues or greatly diluted in the recipient's blood stream. Hence O blood group individuals are called universal donors.

12. Protection of Baby Against Rh-Incompatibility: -

1. Baby can be protected against Rh-incompatibility by giving her mother an injection of Rh antiserum during early pregnancy and immediately after birth. The Rh—antibodies in Rh antiserum will destroy Rh+ RBC of the fetus before they stimulate production of maternal anti—Rh antibodies. The injected antiserum

disappears before the next pregnancy.
2. Sometimes a mild ABO incompatibility protects the baby against a more severe Rh—incompatibility. If

O- mother conceives A+ or B+ baby, any fetal A or B type RBC entering the mother's blood quickly destroyed by her anti -A or anti—B antibodies, before she can form anti—Rh antibodies.

13. Multifactorial Inheritance: -

1. It is polygenic inheritance with environmental Influence.
2. Blood pressure is an example of multifactorial trait. Blood pressure is influenced by environment factors such as diet, stress and tension.
3. Diabetes mellitus is an other example of multifactorial inheritance which is inherited by several genes and is influenced by environment.

14. MODY: -

1. MODY means maturity onset diabetes of the young.
2. It is the form of diabetes mellitus type II which is developed before 25 years of age. ▲
3. About 2 % - 5 % of type II diabetics develop MODY.
4. MODY can be inherited as an autosomal dominant trait.
5. About 50 % of cases of MODY are caused by

mutation in glycol kinase gene. Glycol kinase enzyme usually converts glucose to glucose-6-phosphate in pancreas.

6. MODY can also be caused by mutations in any any of the four genes which encode transcription factors involved in pancreatic development and insulin regulation.

15. Child IQ: -

Yes, a child can have more intelligence (IQ score) than his parents because intelligence is controlled by polygene which can be improved by environment.

(II) From Punjab Boards:-
LAHORE BOARD QUESTIONS

1. What is gene pool? (Lahore Board-2008-A)
2. Define epistasis. (Lahore Board-2008-A)
3. Define sex-influenced trait. (Lahore Board-2008-A)
4. Define crossing over. (Lahore Board-2008-A)
5. Define co-dominance. (Lahore Board-2008-A)
6. What is product rule? (Lahore Board-2008-A)
7. What is test cross? (Lahore Board-2008-A)
8. What is Mody? (Lahore Board-2008-A)
9. What is sex influenced trait? (Lahore Board-2009-A)
10. What is test cross? Why did Menedel advise this cross? (Lahore Board-2009-A)
11. Compare between epistasis and pleiotropy. (Lahore Board-2010-A)
12. The value of parental combinations of two linked gene AB and ab is 40, 40 and of recombinant genes Ab and aB is 10, 10 respectively. Find recombination frequency. (Lahore Board-2010-A)
13. Differentiate between autosome and sex chromosome. (Lahore Board-2011-A)
14. What is test cross? (Lahore Board-2011-A)
15. Differentiate between homozygous and heterozygous. (Lahore Board-2011-A)
16. Define recombination frequency. Give its importance. (Lahore Board-Group-I-2012-A)
17. Define linkage groups by giving example. (Lahore Board-Group-I-2012-A)

18. How does ABO incompatibility protect the developing baby against Rh- incompatibility?
(Lahore Board-Group-I-2012-A)
19. Differentiate between dominance and epistasis.
(Lahore Board-Group-II-2012-A)
20. What is test cross? Give example.
(Lahore Board-Group-II-2012-A)
21. Give the concept of incomplete dominance and codominance.
(Lahore Board-Group-II-2012-A)
22. What is pleiotropy and its example?
(Lahore Board-Group-I-2013-A)
23. What are linkage groups and give their number in human beings?
(Lahore Board-Group-I-2013-A)
24. What are compound sex chromosomes and their example?
(Lahore Board-Group-I-2013-A)
25. What is Epistasis? Explain it with example of Bombay Phenotype.
(Lahore Board-Group-I-2013-A)
26. What is test cross? Give its uses.
(Lahore Board-Group-II-2013-A)
27. What are sex limited traits?
(Lahore Board-Group-II-2013-A)
28. Define crossing over. What is its importance?
(Lahore Board-Group-II-2013-A)
29. Compare monohybrid with dihybrid.
(Lahore Board-New Scheme-Group-I) (2014-A)
30. Differentiate between homozygous and heterozygous.
(Lahore Board-New Scheme-Group-I) (2014-A)
30. Differentiate between gene and gene pool.
(Lahore Board-New Scheme-Group-I) (2014-A)
31. Define True Breeding.
(Lahore Board-New Scheme-Group-II) (2014-A)
32. Compare allele with multiple alleles.
(Lahore Board-New Scheme-Group-II) (2014-A)
33. Differentiate between phenotype and genotype.

(Lahore Board-New Scheme-Group-II) (2014-A)

Answers

1. Gene Pool: -

See Exercise Chapter No: 22 Answer No: 2

2. Epistasis: -

- Epistasis is a gene interaction in which an effect caused by a gene at one locus interferes with or hides the effect caused by another gene at another locus.
- Epistasis literally means standing top of. It is interaction between two non-allelic genes in which one of them modifies phenotypic expression of the other.
- The expression of ABO blood type antigens by I^A or I^B gene depends upon presence of another gene H. ABO locus is on chromosome 9 while H locus is on chromosome 19.
- Allele I^A produces antigen A while allele I^B produces antigen B. Antigen A or antigen B or both are expressed only when sugar produced by HH or Hh genotype is inserted onto the precursor glycoprotein on the surface of RBC.
- Antigen A or B or both are not expressed in the person who has hh genotype because this genotype does not produce any sugar, hence hh individuals lack the site of attachment for antigen A or Antigen B or both on RBC. Such individuals are phenotypically like O but are not genotypically O. Their phenotype is called Bombay phenotype.

3. Sex-influenced Trait: -

- It is a genetic trait that is expressed differentially in males and females.
 - It occurs between males and females but it is more common in one sex.
 - It is controlled by an allele that is expressed as dominant in one sex but recessive in other. This difference in expression is due to hormonal difference between the sexes.
 - For example, pattern baldness is a sex-influenced trait. Many more men than women are bald. It is inherited as an autosomal dominant trait in males but as an autosomal recessive trait in females. A heterozygous male is bald but a heterozygous female is not. A woman can be bald only when she is homozygous recessive.
- #### 4. Crossing Over: -
- Crossing over is an exchange of segments between non-sister chromatids of homologous chromosomes during meiosis.
 - Exchange of chromosome segments logically means exchange of DNA i.e. genes or alleles.
 - During meiosis, homologous chromosomes pair up

lengthwise, point to point and locus to locus in a process termed synapsis.

4. Chiasmata are formed at many places between non-sister chromatids of homologous chromosomes.

5. Crossing over occurs at four strand stage between non-sister chromatids. During crossing over the chromatids

break at various points and may rejoin with the chromatid from their homologous partner. As a result, portions of maternal chromatids become attached to paternal chromatids and vice versa.

6. After crossing over, homologous chromosomes separate by opening up chiasmata. Sister chromatids also separate and each becomes an independent chromosome to move singly in each of the four haploid gametes.

7. For example, one homologue carries 'A' and 'B' genes and other homologue has 'a' with 'b'. Allele 'a'

cross over to homologue containing 'A'; and allele 'B' comes on homologue of 'a'. At the end of meiosis

following four types of gametes are formed:

i. Gamete containing chromatid with 'A' and 'B' alleles

(a parental type).

ii. Gamete containing chromatid with 'a' and 'b' alleles

(a parental type).

iii. Gamete containing chromatid with 'A' and 'b' alleles

(a recombinant).

iv. Gamete containing chromatid with 'a' and 'B' alleles

(a recombinant).

5. Co-dominance: -

1. Co-dominance is a condition in which two different alleles of a particular gene on a locus are expressed together in a heterozygote.

2. Different alleles of a gene that are both expressed in a

heterozygous condition are called codominant.

3. For example, if allele A_1 produces substance X and allele A_2 produces substance Y, e.g.,

Allele A_1 ----- Substance X

Allele A_2 ----- Substance Y

Co-dominance occurs when both the alleles express independently in heterozygote (A_1, A_2) and form

their respective products X and Y. The co-dominant heterozygote would have both substances at the

same

time.

4. ABO blood groups provides an example of codominance. In the ABO system, there are four phenotypic blood groups, A, B, AB and O controlled

by three alleles I^A , I^B and i . I^A produces antigen A,

I^B produces antigen B while i produces no antigen. The alleles for blood groups A and B (i.e. I^A and I^B) are

codominant. If a person inherits alleles for blood group A and group B (i.e. I^A and I^B), his or her red blood cells will carry both antigen A and antigen B.

6. Product Rule: -

1. When two independent events are occurring simultaneously like in Dihybrid cross, the ratio of each

joint phenotypic combination can be obtained by multiplying the probabilities of individual phenotypes.

It is called product rule.

2. The joint probability that both of the independent events will occur simultaneously, is equal to the product of individual probabilities of each event.

3. For example, in a cross between two traits e. g. seed shape and seed color the F_2 results between two separate monohybrid crosses are listed as:

1. The chance of round seeds = $\frac{3}{4}$

The chance of wrinkled seeds = $\frac{1}{4}$

2. The chance of yellow seeds = $\frac{3}{4}$

The chance of green seeds = $\frac{1}{4}$

By using product rule, we know that:

The chance of round and yellow seeds = $\frac{3}{4} \times \frac{3}{4}$

= $\frac{9}{16}$

The chance of round and green seeds = $\frac{3}{4} \times \frac{1}{4}$ =

$\frac{3}{16}$

The chance of wrinkled and yellow seeds = $\frac{1}{4} \times \frac{3}{4}$ =

$\frac{3}{16}$

The chance of wrinkled green seeds = $\frac{1}{4} \times \frac{1}{4}$ = $\frac{1}{16}$

7. Test Cross: -

1. The crossing of dominant individuals with their homozygous recessives, to determine whether they are

homozygous or heterozygous, is known as Test cross.

2. Offspring that show the dominant character are alike phenotypically but may be either homozygous or heterozygous for that character. To determine their

genotype test cross is used.

3. If the phenotypically dominant individual in a test cross

happens to be homozygous, the phenotypes of

offspring will be all dominant.

4. If the phenotypic dominant individual in a test cross happens to be heterozygous, the phenotypic ratio

among progeny will be $\frac{1}{2}$ dominant and $\frac{1}{2}$ recessive.

8. MODY: -

See Exercise Chapter No: 22 Answer No: 14

9. Sex Influenced Trait: -

See Lahore Board Answer No: 3

10. Test Cross: -

See Exercise Chapter No: 22 Answer No: 4

11. Comparison between Epistasis and Pleiotropy: -

Epistasis	Pleiotropy
1. It is the interaction between different genes occupying different loci.	1. Pleiotropy is the ability of single gene on single locus to have multiple affects.
2. H gene whose locus is on chromosome number 19 interferes the expression of alleles I^A or I^B for ABO blood group	2. White eye gene in <i>Drosophila</i> also affects the shape of sperm storing organs (spermathecae).

whose locus is on
chromosome number 9.

12. Activity: -

When the value of parental combinations of two linked gene AB and ab is 40, 40 and of recombinant genes Ab and aB is 10, 10 respectively, then the recombination frequency can be calculated as:

- a. Parental types = $40 + 40 = 80$
 b. Recombinant types = $10 + 10 = 20$
- $$\frac{\text{Recombinant types}}{\text{Sum of all combinations}} \times 100$$
- $$\frac{20}{40 + 40 + 10 + 10} \times 100 = 20\%$$

Result:

Recombination frequency is 20 %

13. Differences between Autosome and Sex Chromosome: -

See Exercise Chapter No: 22 Answer No: 1 (c)

14. Test Cross: -

See Lahore Board Answer No: 7

15. Differences between Homozygous and Heterozygous: -

See Exercise Chapter No: 22 Answer No: 1 (b)

16. A) Recombination Frequency: -

1. It is the proportion of recombinant types between two gene pairs as compared to sum of all combinations and is given by:

$$\frac{\text{Recombinant types}}{\text{Sum of all combinations}} \times 100$$

2. Recombination frequencies between two linked can be

calculated by backcrossing the heterozygote to a homozygous double recessive.

3. Recombination frequency is directly proportional to the distance between the linked gene loci. Lower the recombination frequency, closer together the genes.

B) Importance of Recombination Frequency: -

The recombination frequency can be used to map the relative positions of genes on chromosome. If 1% of recombination frequency is equal to 1 unit map distance, the two linked genes A and B with a 20% recombination frequency must be 20 map units apart.

17. A) Linkage Groups: -

1. A chromosome carries its linked genes in block in the form of a linkage group.
 2. The number of linkage groups corresponds to the homologous pairs of chromosomes.

B) Example: -

Man has 23 linkage groups.

18. ABO Incompatibility Protecting the Developing Baby Against Rh-Incompatibility: -

ABO incompatibility protects the developing baby against Rh-incompatibility because fetal A or B type RBC, entering the mother's blood quickly destroyed by her anti -A or anti-B antibodies, before she can

form anti-Rh antibodies. This only happens when

O- mother conceives A+ or B+ baby.

19. Differences between Dominance and Epistasis: -

See Exercise Chapter No: 22 Answer No: 1 (i)

20. A) Test Cross: -

Test cross is the way of determining genotype of an organism by crossing it with a homozygous recessive.

B) Example: -

1. A phenotypically round seed could be homozygous (RR) or heterozygous (Rr).
2. In the test cross, round seed plant with unknown genotype is crossed with a known homozygous recessive, rr (wrinkled). The plant with wrinkled seeds will produce gametes with only the recessive r allele.
3. A round homozygote, RR, will produce only R gametes. Thus, if the plant is RR, all the offspring from the test cross will be round heterozygotes, Rr.
4. Half the gametes from a round seeded Rr plant would carry the R allele and half would have the r allele. Thus, if plant with round seed is Rr, half of the offspring from the test cross will, on average, be wrinkled homozygotes, rr, and half will be round heterozygotes, Rr.

21. A) Incomplete Dominance: -

1. When the phenotypes of the heterozygote is intermediate between phenotypes of two homozygotes, it is called incomplete or partial dominance.
2. Red and white colors of flowers in Japanese four-O' clock plants (*Mirabilis jalapa*) are determined by alleles R₁ and R₂ respectively. When both these alleles are together (R₁R₂) in a heterozygote, a pink flower (intermediate between red and white) is produced.

B) Codominance: -

1. It is the phenomenon of inheritance in which both alleles of a contrasting character are dominant and express themselves in heterozygous individual neither masking the effect of each other.
2. In case of MN blood group, the allele L^M produces M antigen on RBC and L^N produces N antigen. When both these alleles are together (L^M and L^N) in a heterozygote, both M and N antigens are produced.

22. A) Pleiotropy: -

1. When a single gene affects two or more traits, the phenomenon is called pleiotropy.
2. A gene with a multiple phenotypic effect is called pleiotropic.

B) Example of Pleiotropy: -

Genes that affect growth rate in humans also influence both weight and height.

23. A) Linkage Groups: -

1. Linkage group is a block (group) of genes whose loci happen to lie close to one another in the same pair of homologous chromosomes.

2. In the linkage group, genes are arranged in a linear order on each chromosome.
3. The number of linkage groups corresponds to the homologous pairs of chromosomes.
- B) Number of Linkage Groups in Human Beings: -**
The number of linkage groups in human being is 23.
- 24. A) Compound Sex Chromosomes: -**
Compound sex chromosomes is a single sex determining group of chromosomes with many X or Y or XY chromosomes of more than one kind.
- B) Example of Compound Chromosomes: -**
The round worm, *Ascaris incurve*, has compound sex chromosomes which vary in large numbers in males and females.
- a. Female of *Ascaris incurve* has 42 chromosomes in the form of 8 pairs of compound X along with 13 pairs of autosomes (16+26).
- b. The male of *Ascaris incurve* has 35 chromosomes comprising 8X plus one Y along with 13 pairs of autosomes (8+1+26).
- 25. A) Epistasis: -**
Epistasis is the blocking of the expression of a gene at one locus by a gene at another locus.
- B) Example of Bombay Phenotype: -**
- The expression of ABO blood type antigens by I^A or I^B gene depends upon presence of another gene H.
 - ABO locus is on chromosomes 9 while H locus is on chromosome 19.
 - Allele I^A produces antigen A while allele I^B produces antigen B. Antigen A or antigen B or both are expressed only when sugar produced by HH or Hh genotype is inserted onto the precursor glycoprotein on the surface of RBC.
 - Antigen A or B or both are not expressed in the person who has hh genotype because this genotype does not produce any sugar, hence hh individuals lack the site of attachment for antigen A or Antigen B or both on RBC. Such individuals are phenotypically like O but are not genotypically O. Their phenotype is called Bombay phenotype.
- 26. A) Test Cross: -**
Test cross is the cross between an organism of unknown genotype with a recessive homozygote.
- B) Uses of Test Cross: -**
It is used to find out the homozygous or heterozygous nature of the genotype.
- 27. Sex Limited Traits: -**
- It is a trait that is limited to only one sex due to anatomical differences.
 - It affects a structure or function of the body present in only males or only females.
 - Sex-limited traits may be controlled by sex-linked or

autosomal genes.

Examples: -

- Milk production in cattle is sex-limited trait. Genes for milk yield in a dairy cattle affect only cows.
- Bread growth in humans is limited to men. A woman does not grow beard herself but she can pass the genes specifying heavy beard growth to her sons.

28. A) Crossing Over: -

Crossing over is an exchange of segments between non-sister chromatids of homologous chromosomes during meiosis.

B) Importance of Crossing Over: -

Crossing over produces genetic variations among offspring. Genetic variations lead to tremendous variations in their traits. Variations provide raw material for evolution by letting them adapt successfully to the changing environment.

29. Comparison of Monohybrid with Dihybrid: -

See Exercise Chapter No: 22 Answer No: 1 (h)

30. Differences between Homozygous and Heterozygous: -

See Exercise Chapter No: 22 Answer No: 1 (b)

30. Differences between Gene and Gene Pool: -

Gene	Gene Pool
It is basic unit of heredity that has informations needed to code for a polypeptide.	All the genes in a population are collectively called gene pool.

31. True Breeding: -

- A true breeding variety is one which, upon self-fertilization, always produces offspring identical to the parents.
- It is an alternative term for homozygous.

Examples: -

- A true-breeding "round" seed plant produces only "round" seeds.
- A true-breeding wrinkled seed plant produces only wrinkled seeds.

32. Comparison of Allele with Multiple Alleles: -

See Exercise Chapter No: 22 Answer No: 1 (d)

33. Differences between Phenotype and Genotype: -

See Exercise Chapter No: 22 Answer No: 1 (a)

GUJRANWALA BOARD QUESTIONS

- What is polygenic traits?
(Gujranwala Board-2008-A)
- What is SRY gene?
(Gujranwala Board-2008-A)
- What is MODY?
(Gujranwala Board-2008-A)
- Differentiate between dominant and recessive trait.
(Gujranwala Board-2008-A)
- Differentiate between homozygous and hemizygous.
(Gujranwala Board-2008-A)
- What is erythroblastosis foetalis?
(Gujranwala Board-2008-A)
- Differentiate between incomplete dominance and

- codominance. (Gujranwala Board-2009-A)
8. How can ABO-incompatibility protect the baby against Rh incompatibility? (Gujranwala Board-2009-A)
9. Define the law of independent assortment. (Gujranwala Board-2010-A)
10. Compare sex limited and sex influenced traits. (Gujranwala Board-2010-A)
11. What is a test cross? (Gujranwala Board-2011-A)
12. Discuss over dominance. (Gujranwala Board-2011-A)
13. Compare homozygous and heterozygous. (Gujranwala Board-2011-A)
14. Define Mendel's law of independent assortment. (Gujranwala Board-2012-A)
15. Differentiate between phenotype and genotype. (Gujranwala Board-2012-A)
16. What is MODY? Write its causes. (Gujranwala Board-2012-A)
17. Define product rule. (Gujranwala Board-2013-A)
18. In Birds the female is heterogenic. How? (Gujranwala Board-2013-A)
19. How blood pressure is a multifactorial trait? (Gujranwala Board-2013-A)
20. What is product rule? (Gujranwala Board-New Scheme-2014-A)
21. What are polygenic traits? Give examples. (Gujranwala Board-New Scheme-2014-A)
22. Differentiate between genotype and phenotype. (Gujranwala Board-New Scheme-2015-A)
23. What is incomplete dominance? (Gujranwala Board-New Scheme-2015-A)
24. What is erythroblastosis foetalis? (Gujranwala Board-New Scheme-2015-A)

Answers

1. Polygenic Traits: -

- A polygenic trait is encoded by alleles of two or more different gene pairs found at different loci, all influencing the same trait in an additive way.
- The genes controlling polygenic traits are called polygenes.
- Polygenic traits vary in degree, or quantitatively, hence are known as continuously varying or quantitative traits.
- Polygenic traits are multifactorial traits because they

are controlled by more than one pair of alleles and are influenced by the environment.

5. Examples: -

Human height, blood clotting time, blood pressure, intelligence, skin color, wheat grain color etc.

2. SRY Gene: -

- SRY stands for "Sex determining regions of Y".
- SRY is the male determining gene.
- It is located at tip of short arm of Y-chromosome.

3. MODY: -

See Exercise Chapter No: 22 Answer No: 14

4. Differences between Dominant and Recessive Trait: -

See Exercise Chapter No: 22 Answer No: 1 (l)

5. Differences between Homozygous and Hemizygous:

Homozygous	Hemizygous
1. Homozygous is a condition in which a pair of identical alleles for a particular gene locus is present.	1. Hemizygous is a condition in which only one allele for a particular gene locus is present.
2. The term homozygous is applied for identical alleles of a gene present on homologous pair of autosomes or a pair of X chromosomes (i.e XX) in females.	2. The term hemizygous is applied for only one allele present on X chromosome in male. A human male is hemizygous for all X-linked genes because its Y chromosome lacks such genes.

6. Erythroblastosis Foetalis: -

- Erythroblastosis foetalis is a disease of newborn in which so many fetal red blood cells are destroyed that fetus may die.
- This condition arises when mother Rh antibodies invade the fetus and start hemolysis (breakdown / bursting) of red blood cells of fetus. As this destruction continues, the fetus becomes anemic. The anemic fetus starts to release many immature erythroblasts into his blood stream.
- This condition leads to abortion or still birth. Even if pregnancy continues, the spleen or liver of the fetus swell as they rapidly produce RBC. The breakdown product of RBC called bilirubin also accumulates in the fetus. Bilirubin damages his brain cells and turns his skin and whites of the eyes yellow. This condition is jaundice. So the baby if born alive, suffer from severe hemolytic anemia and jaundice.

7. Differences between Incomplete Dominance and Codominance: -

See Exercise Chapter No: 22 Answer No: 1 (e)

8. ABO-Incompatibility Protecting Baby against Rh Incompatibility: -

See Lahore Board Answer No: 8

9. Law of Independent Assortment:

- It states that:
"When two contrasting pairs of traits are followed in the same cross, their alleles assort independently into

- gametes".
- According to law of independent assortment, alleles of one pair inherit independently of the other pair. The distribution of alleles of one trait into gamete has no influence on the distribution of alleles of the other trait.
 - For example, when homozygous dominant round and yellow seed plant is crossed with homozygous recessive wrinkled and green seed plant, the chance for a plant to be round or wrinkled is independent of its chance of being yellow or green.
 - The two traits, whose genes are either present on different homologous chromosomes or far away from each other on the same chromosome, appear to assort independently due to crossing over.
- 10. Comparison of Sex Limited and Sex Influenced Traits: -**
See Exercise Chapter No: 22 Answer No: 1 (k)
- 11. Test Cross: -**
See Lahore Board Answer No: 7
- 12. Over Dominance: -**
- It is the dominance relation in which the over dominant heterozygote exceeds in quantity the phenotypic expression of both the homozygotes.
 - For example, in fruit fly *Drosophila* the heterozygote (w^+/w) has more quantity of fluorescent pigments in eyes than wild (w^+/w) or white eye (w/w).
- 13. Comparison of Homozygous and Heterozygous: -**
See Exercise Chapter No: 22 Answer No: 1 (b)
- 14. Mendel's Law of Independent Assortment: -**
See Gujranwala Board Answer No: 9
- 15. Differences between Phenotype and Genotype: -**
See Exercise Chapter No: 22 Answer No: 1 (a)
- 16. A) MODY: -**
- MODY means maturity onset diabetes of the young.
 - It is the form of diabetes mellitus type II which is developed before 25 years of age.
 - About 2 % - 5 % of type II diabetics develop MODY.
 - MODY can be inherited as an autosomal dominant trait.
- B) Causes of MODY: -**
- About 50 % of cases of MODY are caused by mutation in glycokinase gene. Glycokinase enzyme usually converts glucose to glucose-6-phosphate in pancreas.
 - MODY can also be caused by mutations in any of the four genes which encode transcription factors involved in pancreatic development and insulin regulation.
- 17. Product Rule: -**
See Lahore Board Answer No: 6
- 18. Female is Heterogametic in Birds: -**
In Birds, the female is heterogametic because it produces two kinds of eggs Z and W in equal distribution.
- 19. Blood Pressure, a Multifactorial Trait: -**

Blood pressure is a multifactorial trait because it is controlled by genes and is also influenced by environmental factors such as diet, stress and tension.

20. Product Rule: -

See Lahore Board Answer No: 6

21. A) Polygenic Traits: -

Polygenic traits are quantitative characters that are influenced by multiple (more than two) genes, each having a small additive function. Or

It is the trait which is controlled by several allelic pairs, each dominant allele contributes to the phenotype in additive manner.

B) Examples Polygenic Traits: -

- Human skin color is a polygenic trait which is controlled by three to six gene pairs.
- Human height is a more complex polygenic trait.

This

trait is controlled by many pairs of gene at different loci.

22. Differences Between Genotype and Phenotype: -

See Exercise Chapter No: 22 Answer No: 1

23. Incomplete Dominance: -

See D.G.K Board Answer No: 6

24. Erythroblastosis Foetalis: -

See Gujranwala Board Answer No: 6

MULTAN BOARD QUESTIONS

- State Mendel's law of Independent Assortment.
(Multan Board-2008-
A)
- What do you about Bombay henotype?
(Multan Board-2008-
A)
- What is gene pool?
(Multan Board-2008-
S)
- What is test cross? Give its significance.
(Multan Board-2009-
A)
- Define Epistasis and Pleiotropy.
(Multan Board-2009-
A)
- What is the difference between Alleles and Multiple Alleles?
(Multan Board-2009-
S)
- What is crossing over? How many types of gametes are produced?
(Multan Board-2009-
S)
- Differentiate between complete and incomplete dominance.
(Multan Board-2009-
S)
- Write down the significance of Test Cross.
(Multan Board-2010-
A)
- What is Gene Linkage?
(Multan Board-2010-
A)
- Differentiate between Incomplete Dominance and Codominance.
(Multan Board-2010-
S)
- Explain test cross.
(Multan Board-2010-
S)
- Explain Genic System for determination of sex.
(Multan Board-2011-
A)

14. Differentiate between Sex limited and Sex influenced Trait. (Multan Board-2011-A)
15. Define Linkage and give its one disadvantage. (Multan Board-2011-A)
16. What is Test Cross? Give its significance. (Multan Board-2011-S)
17. Differentiate between Monohybrid individual and Dihybrid individual. (Multan Board-2011-S)
18. Define Crossing over. Give its significance. (Multan Board-2011-S)
19. What are Multiple Alleles? (Multan Board-2012-A)
20. Differentiate between Genotype and Phenotype. (Multan Board-2012-A)
21. Compare between Epistasis and Pleiotropy. (Multan Board-2012-A)
22. Define test cross and give its significance. (Multan Board-2012-S)
23. Write a note on over dominance. Give example. (Multan Board-2012-S)
24. What is beanbag genetics? Explain. (Multan Board-2012-S)
25. What are Sex influenced traits? Give example. (Multan Board-2013-A)
26. Differentiate between Tritanopia and Deutermanopia. (Multan Board-2013-A)
27. Differentiate between Genotype and Phenotype. (Multan Board-Old Scheme-2014-A)
28. Differentiate between Sex Limited and Sex Influenced Traits. (Multan Board-Old Scheme-2014-A)
29. How can ABO incompatibility protect the body against Rh incompatibility? (Multan Board-Old Scheme-2014-A)
30. What is meant by Incomplete Dominance? (Multan Board-New Scheme-2014-A)
31. What is Erythroblastosis Foetalis? (Multan Board-New Scheme-2014-A)
32. What is Hypophosphatemic Rickets? (Multan Board-New Scheme-2014-A)
33. Define linkage. (Multan Board-New Scheme-2015-A)
34. What is Sex Limited Trait.

(Multan Board-New Scheme-2015-

- A)
35. Differentiate between Sex Chromosomes and Autosomes. (Multan Board-New Scheme-2015-A)

Answers

- Mendel's Law of Independent Assortment: -**
See Gujranwala Board Answer No: 9
- Bombay Phenotype: -**
 - The persons, whose blood group is like O because tests show no antigens A or B on their RBC but they are not genetically O and their parents have contributed alleles I^A or I^B or both, are called Bombay phenotypes.
 - Bombay phenotype arises when the person lacks glucose (that is not produced by hh genotype) necessary for attachment of antigens A or B or both produced by I^A or I^B or both on RBC.
- Gene Pool: -**
See Exercise Chapter No: 22 Answer No: 2
- A) Test Cross: -**
Test cross is the cross between an Organism of unknown genotype with a recessive homozygote.
- B) Significance of Test Cross: -**
It is used to find out the homozygous or heterozygous nature of the genotype.
- A) Epistasis: -**
Epistasis is a type of gene interaction in which the presence of certain alleles of one locus can prevent or mask the expression of alleles of a different locus.
- B) Pleiotropy: -**
Pleiotropy is the inheritance pattern in which one gene affects many phenotypic characteristics of an individual.
- Difference between Alleles and Multiple Alleles: -**
See Exercise Chapter No: 22 Answer No: 1 (d)
- A) Crossing Over: -**
The exchange of chromosomal material between two non-sister chromatids during meiosis is called Crossing over.
- B) How Many Types of Gametes Produced: -**
Four types of gametes are produced after crossing over. Two gametes contain chromatids with parental combinations and two gametes contain chromatids with recombinants.
- Differences between Complete and Incomplete Dominance: -**
See Exercise Chapter No: 22 Answer No: 1 (e)
- Significance of Test Cross: -**
Offspring that show the dominant character are alike phenotypically but may be either homozygous or heterozygous for that character. To determine their genotype test cross is used. It helps in determining the homozygosity or heterozygosity of the dominant parent.
- Gene Linkage: -**
 - The phenomenon of staying together of all the genes of a chromosome is called gene linkage.

2. Gene linkage is a physical relationship between genes.
3. All the genes on the same chromosome are linked to one another and form a linkage group.
4. The number of linkage groups corresponds to the number of homologous pairs of chromosomes. Man has 23 linkage group groups.
5. Linked genes whose loci are close to each other do not obey Mendel's law of independent assortment, because these can not assort independently during meiosis.
6. Gene linkage minimizes the chances of genetic recombination and variations among offspring.
7. Genes for color blindness, hemophilia, gout etc. form one linkage group on human X-chromosome.
8. Gene for sickle cell anemia, leukemia and albinism make another linkage group on human chromosome 11.
- 11. Differences between Incomplete Dominance and Codominance: -**
See Exercise Chapter No: 22 Answer No: 1 (e)
- 12. Test Cross: -**
 1. Cross fertilization of a phenotypically dominant individual with a homozygous recessive individual is called a test cross.
 2. It helps in determining the homozygosity or heterozygosity of the dominant parent.
 3. When dominant homozygous parent is crossed, all the offspring will be dominant.
 4. But, when cross is between homozygous dominant with recessive, then half will be dominant and half recessive offspring are produced.
- 13. Genic System for Determination of Sex: -**
 1. It is the system of sex determination in which sexes are specified by simple allelic differences at a small number of gene loci.
 2. a and α are two mating types (sexes) of yeast controlled by MAT a and MAT α alleles respectively.
- 14. Differences between Sex limited and Sex influenced**
Trait: -
See Exercise Chapter No: 22 Answer No: 1 (k)
- 15. A) Linkage: -**
 1. Linkage is the tendency for a group of genes located on the same chromosome to be linked together in successive generations. Or
The occurrence of two or more genes on the same chromosome pair is called gene linkage.
 2. Genes on the same chromosome pair are said to be linked and form a linkage group.
- B) One Disadvantage of Linkage: -**
Gene linkage minimizes the chances of genetic recombination and variations among offspring.
- 16. Test Cross and its Significance: -**
See Multan Board Answer No: 4
- 17. Differences between Monohybrid Individual and Dihybrid Individual: -**
See Exercise Chapter No: 22 Answer No: 1 (h)

- 18. Crossing Over and its Significance: -**
See Lahore Board Answer No: 28
- 19. Multiple Alleles: -**
 1. Two or more alternative forms of a gene on single locus which arise by gene mutation are called multiple alleles.
 2. Multiple alleles may have 3 to as many as 300 alleles.
 3. All multiple alleles are produced by gene mutations.
 4. Any two of these multiple alleles can be present in the genome of a diploid organism, but a haploid organism or a gamete can have just one of them in its genome.
- 5. Example: -**
 - a. The ABO blood group is encoded by a single polymorphic gene I on chromosome 9 which has three multiple alleles I^A , I^B and i .
 - b. Alleles I^A and I^B are codominant to each other, although each is dominant to allele i .
 - c. The allele I^A is responsible for producing antigen A, I^B the B antigen, and the i allele produces neither.
 - d. The individuals of genotype $I^A I^A$ or $I^A i$ are type A phenotype, individuals of genotype $I^B I^B$ or $I^B i$ are type B phenotype, the individuals of genotype $I^A I^B$ are type AB phenotype and individuals of genotype ii are type O phenotype, the recessive genotype.
- 20. Differences between Genotype and Phenotype: -**
See Exercise Chapter No: 22 Answer No: 1 (a)
- 21. Comparison between Epistasis and Pleiotropy: -**
See Lahore Board Answer No: 11
- 22. Test Cross and its Significance: -**
See Multan Board Answer No: 4
- 23. A) Note on Over Dominance: -**
Over dominance is the condition in which the over dominant heterozygote exceeds in quantity the phenotypic expression of both the homozygotes.
B) Example of Over Dominance: -
In fruit fly *Drosophila* the heterozygote ($w+/w$) has more quantity of fluorescent pigments in eyes than wild ($w+/w+$) or white eye (w/w).
- 24. Beanbag Genetics: -**
Gene pool represents the beanbag genetics. A bag full of beans represents the population while alleles are like beans in a bag. Or
If we population imagine not as a group of individuals but as a group of individually segregating and randomly assorting alleles, we can understand the concept of beanbag genetics. The alleles are like beans in a bag. The entire beanbag full of beans is the gene pool of the population. In the beanbag approach we can imagine the entire gene pool comprising all the

alleles for all the different traits at once or we can just focus on some subset, such as all the alleles for a single trait.

25. A) Sex-influenced Traits: -

1. It is a genetic trait that is expressed differentially in males and females.
2. It occurs between males and females but it is more common in one sex.
3. It is controlled by an allele that is expressed as dominant in one sex but recessive in other. This difference in expression is due to hormonal difference between the sexes.

B) Example: -

Pattern baldness is a sex-influenced trait. Many more men than women are bald. It is inherited as an autosomal dominant trait in males but as an autosomal recessive trait in females. A heterozygous male is bald but a heterozygous female is not. A woman can be bald only when she is homozygous recessive.

26. Differences between Tritanopia and Deuteranopia: -

Tritanopia	Deuteranopia
1. It is blue blindness.	1. It is green blindness.
2. In tritanopia blue opsin (blue light absorbing protein) is lacking in cone cells in the retina.	2. In deuteranopia green opsin is lacking in cone cells in the retina.
3. It is caused due to mutation in the blue opsin gene present on autosome 7.	3. It is caused due to mutation in the red opsin gene present on X chromosome.

27. Differences between Genotype and Phenotype: -

See Exercise Chapter No: 22 Answer No: 1 (a)

28. Differences between Sex Limited and Sex Influenced Traits: -

See Exercise Chapter No: 22 Answer No: 1 (k)

29. ABO Incompatibility Protecting Baby against Rh Incompatibility: -

See Lahore Board Answer No: 8

30. Incomplete Dominance: -

Incomplete dominance is a type of inheritance in which neither of the pair of contrasting alleles is dominant over the other and the heterozygous individual is intermediate in phenotype.

31. Erythroblastosis Foetalis: -

1. It is the hemolytic disease of Rh + fetus whose mother is Rh-.
2. It occurs when mother Rh antibodies destruct RBCs fetus leading to anemia due to which fetus starts to release many immature erythroblasts into his blood.
3. Erythroblastic foetalis usually leads to still birth or abortion.
4. Even if pregnancy continues, the spleen and liver of the fetus rapidly produce RBC and often swell.
5. Continuous hemolysis of RBCs leads to the formation of bilirubin that causes damage to brain cells leading

to jaundice.

6. Baby, if born alive, suffers from severe hemolytic anemia and jaundice.

32. Hypophosphatemic Rickets: -

1. It is a rare hereditary disease.
2. It is an X-linked dominant trait.
3. It is caused due to genetic communication failure at molecular level. The genes encoding bone proteins never receive vitamin D's message to function.

33. Linkage: -

See Multan Board Answer No: 10

34. Sex Limited Trait: -

See Lahore Board Answer No: 27

35. Differentiate between Sex Chromosomes and Autosomes: -

See Exercise Chapter No: 22 Answer No: 1 (c)

BAHAWALPUR BOARD QUESTIONS

1. What are protanopia and tritanopia?
(Bahawalpur Board-2008-A)
2. What is gene pool?
(Bahawalpur Board-2008-A)
3. What do you mean by sex-linked trait?
(Bahawalpur Board-2008-A)
4. Differentiate between Phenotype and Genotype.
(Bahawalpur Board-2008-A)
5. What is Test Cross? Give its importance.
(Bahawalpur Board-2009-A)
6. Explain MODY.
(Bahawalpur Board-2009-A)
7. What is meant by the term: Protanopia and Deuteranopia.
(Bahawalpur Board-2009-A)
8. What is Gene Pool?
(Bahawalpur Board-2009-A)
9. Differentiate between Dominant and Recessive Trait.
(Bahawalpur Board-2010-A)
10. Define Gene Pool.
(Bahawalpur Board-2010-A)
11. What is MODY?
(Bahawalpur Board-2011-A)
12. Explain Gene and Allele.
(Bahawalpur Board-2011-A)
13. What are Multiple Alleles? Give an example.
(Bahawalpur Board-2011-A)
14. Define Sex Influenced Trait.
(Bahawalpur Board-2012-A)
15. Define Allele and Multiple Allele.
(Bahawalpur Board-2012-A)
16. Define Law of Segregation.
(Bahawalpur Board-2013-A)
17. State the role of particulate heredity factors.

(Bahawalpur Board-2013-

A)
18. An Rh- woman is married with Rh+ man whose father

was also Rh+. What is the probable risk of Erythroblastosis Foetalis in their babies?

(Bahawalpur Board-2013-

A)
19. Differentiate between Autosomes and Sex Chromosomes.

(Bahawalpur Board-New Scheme-2014-

A)
20. What is Epistasis?

(Bahawalpur Board-New Scheme-2014-

A)
21. What are Multiple Alleles?

(Bahawalpur Board-New Scheme-2014-

A)
22. What are Polygenes? How polygenic inheritance takes place?

(Bahawalpur Board-New Scheme-2015-

A)
23. What is Gene Linkage?

(Bahawalpur Board-New Scheme-2015-

A)
24. What are Sex Chromosomes?

(Bahawalpur Board-New Scheme-2015-

A)

Answers

1. A) Protanopia: -

1. It is red blindness.
2. It is caused due to lack of red opsin in the cone cells in

the retina.

3. Lacking of red opsin in the cone cells is due to mutation in the red opsin gene present on X-chromosome.

B) Tritanopia: -

1. It is blue blindness.
2. It is caused due to lack of blue opsin in the cone cells in the retina.
3. Lacking of blue opsin in the cone cells is due to mutation in the blue opsin gene present on autosome 7.

2. Gene Pool: -

See Exercise Chapter No: 22 Answer No: 2

3. Sex-linked Trait: -

1. A trait whose genes are present on sex chromosomes (i.e. X chromosome) is called sex-linked trait.
2. It is also called X-linked trait.
3. In mammals the Y chromosome is much smaller than

the X chromosome, and so does not carry as many genes. It follows that there will be some gene loci on the X chromosome that are not present on Y chromosome. Males therefore have only one copy of these X-linked genes, while females have two.

4. Humans have many sex-linked (X-linked) traits of which some are recessive while others are dominant, hence sex linked traits are divided into:

a. Sex-linked (X-linked) recessive trait: -

- i. It is a trait which is determined by an X-linked recessive gene.

- ii. An X-linked allele that is recessive in female is therefore expressed in males. In female this allele is expressed only when she inherits the allele from

both

her parents.

- iii. Sex-linked recessive trait passes in a crisscross or zigzag fashion from maternal grandfather through a carrier daughter to grandson. It never passes from father to son.

- iv. Examples of sex-linked recessive traits in humans are

red-green color blindness and hemophilia.

b. Sex-linked (X-linked) dominant trait: -

- i. It is a trait which is determined by an X-linked dominant gene.
- ii. These are common in females, since they can inherit the allele from either parent, but a male can only inherit it from his mother.
- iii. Hypophosphatemic rickets or vitamin D-resistant rickets is an example of sex-linked dominant trait.

4. Differences between Phenotype and Genotype: -

See Exercise Chapter No: 22 Answer No: 1 (a)

5. Test Cross and its Importance: -

See Multan Board Answer No: 4

6. MODY: -

See Exercise Chapter No: 22 Answer No: 14

7. A) Protanopia: -

See Bahawalpur Board Answer No: 1 (A)

B) Deuteranopia: -

1. It is green blindness.
2. It is caused due to lack of green opsin in the cone cells in the retina.

3. Lacking of green opsin in the cone cells is due to mutation in the red opsin gene present on X-chromosome.

8. Gene Pool: -

See Exercise Chapter No: 22 Answer No: 2

9. Differences between Dominant and Recessive Trait: -

See Exercise Chapter No: 22 Answer No: 1 (I)

10. Gene Pool: -

See Exercise Chapter No: 22 Answer No: 2

11. MODY: -

See Exercise Chapter No: 22 Answer No: 14

12. A) Gene: -

1. Genes are discrete hereditary factors that determine traits (clearly defined inherited characteristics).
2. They contain the informations needed to code for a polypeptide.
3. Genes are contained in chromosomes within each cell nucleus. They reside in a long DNA molecule of chromosome in linear order.
4. Each gene occupies a specific position on a chromosome called the gene locus.
5. All the genes on a chromosome are said to be linked to one another and belong to the same group.

Wherever

the chromosome goes it carries the all of the genes

in

its linkage group with it.

6. The behavior of genes is paralled in many ways by the behavior of chromosomes of which they are a part.
7. Genes exist in alternative forms and give rise to alternative versions of a given trait.
8. Diploid organisms carry two genes for each characteristic, but each gamete carries only one of each pair.
9. Genes are passed on to offspring during reproduction.
- When gemetes (with single gene of each pair) unite at fertilization to form zygote, two genes again exist in pair, one from each parent.
10. The zygote then develops into a new organism consisting of many cells. Copies of the original set of genes are copied each time a new cell is produced by mitosis.
- B) Allele: -**
1. Alleles or allelomorphic genes (allelomorph means 'alternative form') are alternative forms of a gene at a given locus.
 2. Alleles of each gene occupy the corresponding positions on homologous chromosomes and control the same characteristic.
 3. Generally two alternative forms of a gene are found, but there may be several alternative forms (more than two) which are called multiple alleles.
 4. Only two alleles of a given gene are normally present in an organism, one from each parent.
 5. Alleles segregate during the formation of gemetes, only one allele from each pair goes into each gamete.
 6. The segregation of one pair of alleles is not affected by the segregation of another pair of alleles.
- 13. Multiple Alleles: -**
1. Two or more alternative forms of a gene on single locus which arise by gene mutation are called multiple alleles.
 2. Multiple alleles may have 3 to as many as 30 alleles.
 3. All multiple alleles are produced by gene mutations.
 4. Any two of these multiple alleles can be present in the genome of a diploid organism, but a haploid organism or a gamete can have just one of them in its genome.
- B) Example: -**
- a. The ABO blood group is encoded by a single polymorphic gene I on chromosome 9 which has three multiple alleles I^A , I^B and i .
 - b. Alleles I^A and I^B are codominant to each other, although each is dominant to allele i .
 - c. The allele I^A is responsible for producing antigen A, I^B the B antigen, and the i allele produces neither.

- d. The individuals of genotype $I^A I^A$ or $I^A i$ are type A phenotype, individuals of genotype $I^B I^B$ or $I^B i$ are type B phenotype, the individuals of genotype $I^A I^B$ are type AB phenotype and individuals of genotype ii are type O phenotype, the recessive genotype.
- 14. Sex Influenced Trait: -**
See Bahawalpur Board Answer No: 3
- 15. A) Allele: -**
1. Partners of a gene pair are called alleles.
 2. Each allele of a gene pair occupies the same gene locus on its respective homologue.
 3. Both alleles on one gene locus may be identical, or different from each other.
- B) Multiple Allele: -**
1. Genes mutations may produce many different alleles of a gene. Some genes have as many as 300 alleles. All such altered alternative forms of a gene, whose number is more than two, are called multiple alleles.
 2. Any two of these multiple alleles can be present in the genome of a diploid organism, but a haploid organism or a gamete can have just one of them in its genome.
- 16. Law of Sgregation: -**
1. According to the law of segregation, the two co-existing alleles for each trait in an individual segregate (separate) from each other at meiosis, so that each gamete receives only one of the two alleles. Alleles unite again at random fertilization of gametes when zygote is formed.
 2. Mendel crossed a pure breeding round seed pea plant with a pure breeding wrinkled seed plant. In F_1 generation, he obtained all round seed plants indicating that round seed shape is dominant over wrinkled seed shape. But, when he self-crossed F_1 plants, he obtained round and wrinkled seed plants in a ratio of 3:1. If the dominant round seed shape is represented by R and dwarf by r, then Mendel's experiment can be explained as follows:
- 17. Role of Particulate Heredity Factors: -**
Particulate heredity factors carry hereditary informations that are transmitted from parents to offspring through gametes.
Example: -
Each pea plant has a pair of particulate hereditary factors, one derived from male parent and other from female parent. Both of these factors together control the expression of a trait.
- 18. Activity: -**
When an Rh- women is married with Rh+ man whose father was also Rh+. The probable risk of Erythroblastosis Foetalis in their babies is 50 % as shown in the following cross:
- 19. Differences between Autosomes and Sex Chromosomes: -**

See Exercise Chapter No: 22 Answer No: 1 (a)

20. Epistasis: -

See Lahore Board Answer No: 2

21. Multiple Alleles: -

See Bahawalpur Board Answer No: 13

22. A) Polygene: -

The genes controlling polygenic traits are called polygenes. Or
Polygenes are alleles of two or more gene pairs at different loci influencing the same trait in an

additive way.

B) How Polygenic Inheritance Takes Place: -

1. Each polygene has a small positive or negative effect

on the character.

2. Polygenes supplement each other and sum of positive or negative effects of all individual genes produce quantitative phenotype of a continuously varying trait.

For example, wheat grains vary in color from white to

dark red. In wheat, when plants that produce white seeds are crossed with plants that produce dark red seeds, the F_1 plants are intermediate in color i.e.

light red. If the F_1 plants are allowed to self-pollinate, the F_2

plants produce seeds having one of the seven shades of color in the following ratio:

1 : dark red : 6 moderately dark red : 15 red : 20

light red : 15 pink : 6 light pink : 1 white.

These results can be explained by assuming that

color of seeds is controlled by genes at three different loci and that each dominant allele contributes a small but equal effect to the phenotype.

23. Gene Linkage: -

See Multan Board Answer No: 10

24. Sex Chromosomes: -

1. The chromosomes which determine the sex of an individual are known as Sex Chromosomes.
2. Usually there is one pair of sex chromosomes which are different in males and females.

3. The other chromosomes of an individual that do not determine the sex are similar in males and females

and are called autosomes.

4. Sex chromosomes were discovered by T. H Morgan

in 1911 in *Drosophila*. He noticed out of four pairs of chromosomes, three pairs were similar in both sexes (called autosomes) while the fourth pair was very different. The female had had two rod shaped chromosomes (which he called X chromosomes) in

the fourth pair while the male had one rod shaped chromosome (i.e. X chromosome) but other was

hook or j shaped (which he called Y chromosome).

5. Humans have 46 chromosomes in the form of 23 pairs.

22 pairs are similar in both sexes and are called autosomes, while the 23rd pair of chromosome called sex chromosome is very different in males and females. A human female (woman) has two similar chromosomes in her 23rd pair but the human male (man) has an X chromosome along with a much

shorter Y chromosome containing SRY gene determining maleness in his 23rd pair.

FAISALABAD BOARD QUESTIONS

1. Define multiple alleles. (Faisalabad Board-2008-A)

2. What is SRY and where this gene resides? (Faisalabad Board-2008-A)

3. Differentiate between Homozygous and Heterozygous. (Faisalabad Board-2008-A)

4. Give the significance of test cross. (Faisalabad Board-2009-A)

5. Differentiate between incomplete dominance and co-dominance. (Faisalabad Board-2009-A)

6. How many pair of autosomes and sex chromosomes are present in human? (Faisalabad Board-2009-A)

7. What do you understand by term True breeding? (Faisalabad Board-2009-A)

8. What are sex influenced traits? (Faisalabad Board-2009-A)

9. What is Albinism? (Faisalabad Board-2010-A)

10. What are secretors? (Faisalabad Board-2010-A)

11. What is heterogametic individual? Give example. (Faisalabad Board-2011-A)

12. Describe the inheritance of skin colour in humans. (Faisalabad Board-2011-A)

13. Define probability? (Faisalabad Board-2012-A)

14. Give the significance of test cross. (Faisalabad Board-2012-A)

15. Give difference between genotype. (Faisalabad Board-2012-A)

16. What is type II diabetes or NIDDM? (Faisalabad Board-2013-A)

17. Differentiate between homogametic and heterogametic organisms. (Faisalabad Board-2013-A)

18. What is the product rule? (Faisalabad Board-2013-A)

19. What is MODY? (Faisalabad Board-Old Scheme) (2014-
A)
20. What is Test Cross? (Faisalabad Board-Old Scheme) (2014-
A)
21. What is over dominance? (Faisalabad Board-Old Scheme-2014-
A)
22. Define test cross. Give its application. (Faisalabad Board-Old Scheme-2014-
A)
23. What are polygenic traits? Give examples. (Faisalabad Board-Old Scheme-2014-
A)
24. What is product role? (Faisalabad Board-Old Scheme-2014-
A)
25. Differentiate between homomzygote and Heterozygote. (Faisalabad Board-New Scheme-2015-
A)
26. What is test cross? (Faisalabad Board-New Scheme-2015-
A)
27. What is over dominance? (Faisalabad Board-New Scheme-2015-
A)

Answers

1. **Multiple Alleles:** -
See Bahawalpur Board Answer No: 13
2. **A) SRY:** -
SRY (sex determining regions of Y) is the male determining gene.
- B) Where SRY Gene Resides:** -
SRY gene resides at the tip of short arm of Y-chromosome.
3. **Differences between Homozygous and Heterozygous:** -
See Exercise Chapter No: 22 Answer No: 1 (b)
4. **Significance of Test Cross:** -
See Multan Board Answer No: 9
5. **Differences between Incomplete Dominance and Co-dominance:** -
See Exercise Chapter No: 22 Answer No: 1 (e)
6. **Pairs of Autosomes and Sex Chromosomes in Human:** -
a. 22 pairs of autosomes are present in humans.
b. One pair of sex chromosomes are present in humans.
7. **True Breeding:** -
1. The term true-breeding is used for an organism which, when mated with same genotype, gives rise to offspring that all resemble the parents.
2. It is an alternative term for homozygous.
3. A true-breeding round seed plant produces only round seeds.
8. **Sex Influenced Traits:** -
See Lahore board Answer No: 3

9. Albinism: -

1. Albinism is the inability to make the pigment melanin.
2. Albinism is an autosomal heredity disease.
3. Albinism is caused by an allele that is recessive to normal pigment producing allele.
4. In albinism, the iris of the eye of albino (the affected person) is pink, the hair is white or very pale yellow, and the skin is unpigmented and easily damaged by sunlight.

10. Secretors: -

1. Secretors are the persons who have A and B antigens in their saliva and other body fluids.
2. They have dominant secretor gene "Se" on chromosome 19.

11. A) Heterogametic Individual: -

1. The individual that produces two types of sex determining gametes is called heterogametic individual.

B) Example: -

Human male is a heterogametic individual who produces two types of sex-determining sperms. Half the sperms carry X-chromosome and other half

carry Y-chromosome. The chances for both types of sperms for fertilization are equal.

12. Inheritance of Skin Colour in Humans: -

Human skin color is also a quantitative trait which is controlled by a three to six gene pairs. The greater the number of pigment specifying genes, the darker the skin. A child can have darker or lighter the skin than his parents.

13. Probability: -

1. Probability is the chance of an event to occur. Or The frequency of any particular possibility is referred to as its probability of occurrence.
2. Stating the results in terms of probabilities allows simple prediction about the outcomes of crosses.
3. The F₂ results of Mendel's law of segregation between

round and wrinkled seed plants are:
Round Seed Plants:Wrinkled Seed Plants
3 : 1

These results can be explained in terms of probabilities as:

- a. There are three chances in four ($\frac{3}{4}$) for a seed to be round.
- b. There is one chance in four ($\frac{1}{4}$) for a seed to be wrinkled.

14. Significance of Test Cross: -

See Multan Board Answer No: 9

15. Difference between Phenotype and Genotype: -

See Exercise Chapter No: 22 Answer No: 1 (a)

16. Type II Diabetes or NIDDM: -

1. Type II diabetes or non insulin dependent diabetes mellitus (NIDDM) is a type of diabetes in which persons produce some indigenous insulin themselves,

but their body cells gradually fail to respond to insulin

and cannot take up glucose from blood. They develop

a sort of insulin resistance.

2. It accounts for 90 % of all diabetic patients.
3. It usually occurs among people over the age of 40.
4. About 2 % --5 % of type II diabetics get the disease early in life, before 25 years of age. It is called maturity onset of diabetes of young (MODY).
5. Type II diabetes is more common among the obese because obesity increases insulin resistance.

Or

1. Type II diabetes or non insulin dependent diabetes mellitus (NIDDM) is characterized by normal or even

increased insulin secretion but reduced sensitivity of insulin's target cells to its presence. In the later stages of this disease, pancreas gradually becomes exhausted

from secreting large amounts of insulin, and full-blown diabetes mellitus occurs.

2. It accounts for 80 to 90 per cent all cases of diabetes.
3. In most cases the onset of type 2 diabetes occurs after age 40 often between the ages of 50 to 60 years and this disease develops gradually. Therefore, this syndrome is often referred to as adult-onset diabetes.
4. About 2 % --5 % of type II diabetics get the disease early in life, before 25 years of age. It is called maturity onset of diabetes of young (MODY).
5. Various genetic and life style factors appear important

in the development of type 2 diabetes. Obesity is the bigger risk factor; 90% of type 2 diabetics are obese.

17. Difference between Homogametic and Heterogametic Organisms: -

Homogametic Organisms	Heterogametic Organisms
1. These organisms form only one type of gametes.	1. These organisms form two types of gametes.
2. This organism is a silent feature in determining the sex of the organism.	2. Gametes of these organisms determine the male or female sex of the organism.
3. Human female is homogametic organism because it produces only type of eggs, each with an X chromosome.	3. Human male is heterogametic organism that produces two types of sex-determining sperms. Half the sperm carry X sperms and other half carry Y chromosome. Sex of the organism is determined by the type of sperm.

18. Product Rule: -

1. It is the rule for combining the probabilities of independent events by multiplying their individual probabilities.
2. When two independent events are occurring simultaneously like in a Dihybrid cross, the ratio of

each joint phenotypic combination can be obtained by

product rule.

3. For example, in a cross between two traits e. g. seed shape and seed color the F_2 results between two separate monohybrid crosses are listed as:

- a. The chance of round seeds = $\frac{3}{4}$
The chance of wrinkled seeds = $\frac{1}{4}$
- b. The chance of yellow seeds = $\frac{3}{4}$
The chance of green seeds = $\frac{1}{4}$
4. The joint probability that both of the independent events will occur simultaneously, is equal to the product of individual probabilities of each event.

Event No: 1	Event No: 2	Both events at a time
Seed shape	Seed color	Seed shape and color
Independent probability to be:	Independent probability to be:	Joint probability of being:
Round = $\frac{3}{4}$ Round = $\frac{3}{4}$ Wrinkled = $\frac{1}{4}$ Wrinkled = $\frac{1}{4}$	Yellow = $\frac{3}{4}$ Green = $\frac{1}{4}$ Yellow = $\frac{3}{4}$ Green = $\frac{1}{4}$	Round yellow = $\frac{3}{4} \times \frac{3}{4} = \frac{9}{16}$ Round green = $\frac{3}{4} \times \frac{1}{4} = \frac{3}{16}$ Wrinkled yellow = $\frac{1}{4} \times \frac{3}{4} = \frac{3}{16}$ Wrinkled green = $\frac{1}{4} \times \frac{1}{4} = \frac{1}{16}$

19. MODY: -

See Exercise Chapter No: 22 Answer No: 14

20. Test Cross: -

See Lahore board Answer No: 3

21. Over Dominance: -

See Gujranwala Board Answer No: 12

22. A) Test Cross: -

The mating of phenotypically dominant individual with its homozygous recessive is called Test cross.

B) Application of Test Cross: -

Test cross is applied to determine the homozygosity

or

heterozygosity of the dominant parent.

23. Polygenic Traits with Examples: -

See Gujranwala Board Answer No: 1

24. Product Rule: -

See Faisalabad Board Answer No: 18

25. Differences between Homozygote and Heterozygote: -

Homozygote	Heterozygote
1. It is an individual that has two identical alleles of a trait. Or An organism carrying two of the same allele for a given character is called homozygote.	1. It is an individual that has two different alleles of a trait. Or An organism carrying two different alleles for a given character is called heterozygote.
2. It always has a homozygous genotype for a particular trait.	2. It always has a heterozygous genotype for a particular trait.

26. Test Cross: -

See Lahore Board Answer No: 7

27. Over Dominance: -

See Gujranwala Board Answer No: 12

RAWALPINDI BOARD QUESTIONS

1. What is the pattern of X-linked Dominant Inheritance?

(Rawalpindi Board-2010-

A)

2. What is Haemophilia and its different types?

(Rawalpindi Board-2010-

A)

3. Differentiate between homogametic and heterogametic individuals.

(Rawalpindi Board-2010-

A)

4. Compare genotype and phenotype.

(Rawalpindi Board-2011-

A)

5. Define law of segregation.

(Rawalpindi Board-2011-

A)

6. What is dihybrid cross? (Rawalpindi Board-2011-

A)

7. What is monochromacy? (Rawalpindi Board-2012-

A)

8. Define genic system and give its one example.

(Rawalpindi Board-2012-

A)

9. What is meant by discontinuous variations?

(Rawalpindi Board-2012-

A)

10. Define Codominance and give an example.

(Rawalpindi Board-2013-

A)

11. What is epistasis? Differentiate it from dominance.

(Rawalpindi Board-2013-

A)

12. Differentiate between dominant and recessive traits with examples.

(Rawalpindi Board-2013-

A)

13. Define Codominance.

(Rawalpindi Board-New Pattern-2014-

A)

14. Differentiate between gene and allele.

(Rawalpindi Board-New Pattern-2014-

A)

15. Differentiate between phenotype and genotype.

(Rawalpindi Board-New Pattern-2014-

A)

16. Differentiate between Linkage and Crossing over.

(Rawalpindi Board-New Pattern-2015-

A)

16. What would be the sex of a Drosophila and a Human

with XXY chromosomes?

(Rawalpindi Board-New Pattern-2015-

A)

17. What are Polygenic Traits? Give two examples in humans.

(Rawalpindi Board-New Pattern-2015-

A)

Answers

1. Pattern of X-linked Dominant Inheritance: -

It is more common in females than males. All

daughters of an affected father, but none of his sons is

affected. Any heterozygous affected mother will pass

the trait equally to half of her sons and half of her and half of her daughter. Or

It is more common in females than males, since they can inherit the allele from either parent, but a male

can

inherit it from a single parent.

2. A) Haemophilia: -

1. Hemophilia is a group of heredity diseases characterized by failure of blood to clot.

2. It is an X-linked recessive disorder that results in a reduction or malfunction or complete absence of one of the blood component required for clotting as a result of an inherited genetic mutation.

3. Hemophiliac's blood fails to clot properly after an injury. It is a serious hereditary disease because a hemophiliac may bleed to death even from a minor cuts.

B) Different Types of Hemophilia: -

1. Hemophilia is of three types:

a. Hemophilia A: -

1. Hemophilia A is sex-linked recessive trait.

2. It is controlled by single recessive gene h located on X

chromosome.

3. 80% hemophiliacs, suffer from hemophilic A.

4. Hemophilia A is caused by the absence of blood clotting factor VIII.

5. It is characterized by severe internal bleeding in the head, joints, and other areas from even a slight wound.

6. The mode of inheritance is X-linked recessive. Thus the affected individuals are almost exclusively male, having inherited the abnormal allele from their heterozygous carrier mothers. For a female to be infected by an X-linked trait, she would have to

inherit

allele from both parents, whereas an affected male need only inherit one defective allele from his mother.

b. Hemophilia B: -

1. It is an X-linked recessive disorder.

2. About 20% hemophilics, suffer from hemophilia B.

3. It is caused due to disturbance in IX.

4. Being X-linked recessive, it is more common in men than women.

c. Hemophilia C: -

1. Less than 1% suffer from hemophilia C.

2. It is caused due to reduction in clotting factor XI.

3. Hemophilic C is autosomal disorder and affects both the sexes equally.

3. Differences between Homogametic and Heterogametic Individuals: -

See Faisalabad Board Answer No: 17

4. Comparison of Genotype and Phenotype: -

See Exercise Chapter No: 22 Answer No: 1 (a)

5. Law of Segregation: -

1. Law of segregation can be stated as:

"Individuals carry pair of genes, termed alleles, that influence particular inherited traits. The alleles

segregate during the formation of gametes”.

Or

“Of the two alleles controlling each character, only one is present each gamete”.

Or

It states that two alleles of a locus become separated into different gametes.

Or

It states that alternative alleles for the same gene segregate from each other in production of gametes.

- Mendel's law of segregation explains the presence of discrete heredity units, their simpler interaction leading to dominance, their segregation and recombination at random.

- When Mendel crossed two contrasting varieties of peas, he obtained all offspring, that resembled one of the their parents. He referred to offspring as first filial generation and the form or trait expressed in F₁ plants

as dominant and its alternative form the recessive.

For

each of the seven pairs of contrasting traits that Mendel examined, one of the pair proved to be dominant and other recessive. After allowing F₁ plants to mature and self fertilize, Mendel collected and planted the seeds from each plant to see what

the offspring in the second filial generation, or F₂ would

look like. He obtained dominant and recessive

plants 3

: 1 ratio.

6. Dihybrid Cross: -

- It is a genetic cross that takes into account the behavior of alleles of two loci.
- A dihybrid cross involves crossing individuals that are

heterozygous at two different loci. Or

A mating between two individuals with different alleles at two loci is called a dihybrid cross.

- This cross involves the segregation of alleles of two genes.

In pea plant, round seed shape is dominant to wrinkled seed shape, and yellow seed color is dominant to green

seed color. When a homozygous round yellow seed plants (RRYY) is crossed with a homozygous wrinkled green (rryy) seed plants, all the F₁ plants

are

typically round yellow. The dihybrid cross is made

by

allowing self-fertilization among F₁ dihybrids, four phenotypes appear in the following approximate proportions:

- 9/16 are round yellow
 - 3/16 are round green
 - 3/16 are wrinkled yellow
 - 1/16 are wrinkled green
4. From the results of dihybrid cross it is concluded that

allele for seed shape and seed color are not bound to remain in parental combinations for ever, i.e. R with

Y

and r with y; rather these are free to assort

independently. R could go with Y or y in any

gamete

with equal chance. Similarly, r could go with y or Y

in

any gamete with equal probability.

7. Monochromacy: -

- Monochromacy is the condition in which the person called monochromate can perceive only one color, that

is blue.

- Monochromacy, more accurately blue cone monochromacy, is an X-linked recessive trait.

- In blue cone monochromacy, both red and green cone

cells are absent. That is why, it is also called red-green

color blindness.

- It is true color blindness.

8. A) Genic System: -

It is a system for determination of sex in which the sexes are specified by simple allelic differences at a small number of gene loci.

B) One Example: -

A and α are the two mating types (sexes) of yeast controlled by MAT a and MAT α alleles

respectively.

9. Discontinuous Variations: -

- It is the variation of an 'either or' type in which individuals can be classified into discrete groups.
- These variations take the form of distinct, alternative phenotypes with no intermediates.
- They can not be measured.
- They are also called qualitative variations.
- These variations are under the control of a single pair

of alleles or a small number of genes.

- Discontinuous variations can not usually be altered by

the environment.

10. A) Co-dominance: -

- It is the inheritance pattern in which both alleles of a gene are equally expressed.
- The alleles which are both expressed in a heterozygote

are called co-dominant.

B) Example: -

The human ABO blood group is an excellent

example

of codominant allele. Blood types A, B, AB and O

are

controlled by three alleles I^A, I^B and i representing a single locus. Allele I^A codes for the synthesis of a specific glycoprotein, antigen A, which is expressed on the surface of RBCs. Allele I^B leads to antigen B. Allele i does not code for any antigen. Neither allele I^A nor allele I^B is dominant to other. Both alleles are expressed phenotypically in the heterozygote

producing

both A and B antigens, and are therefore

codominant

to each other, although each is dominant to allele i.

11. A) Epistasis: -

When an effect caused by a gene or gene pair at one locus interferes with or hides the effect caused by another gene or gene pair at another locus, such phenomenon of gene interaction is called epistasis.

B) Epistasis Different From Dominance:

Epistasis is the interaction between genes occupying different loci while dominance is the relationship between alleles of same gene occupying the same locus.

12. Differences between Dominant and Recessive Traits with Examples: -

See Exercise Chapter No: 22 Answer No: 1 (I)

13. Codominance: -

See Lahore Board Answer No: 10 (A)

14. Differences between Gene and Allele: -

See Exercise Chapter No: 22 Answer No: 1 (g)

15. Differences between Phenotype and Genotype: -

See Exercise Chapter No: 22 Answer No: 1 (a)

16. Differences between Linkage and Crossing Over: -

Linkage	Crossing Over
1. It is the phenomenon of staying together of all the genes of a chromosome.	1. Crossing over is an exchange of segments (genes) between non-sister chromatids of homologous chromosomes during meiosis hence is the phenomenon of separation of genes.
2. Gene linkage minimizes the chances of genetic recombination and variations among offspring.	2. Crossing maximizes the chances of genetic recombination and variations among offsprings.

17. Sex of a Drosophila and a Human with XXY Chromosomes: -

1. Sex of a Human with XXY ----- Male

2. Sex of a Drosophila with XXY ----- Female

18. A) Polygenic Traits: -

See Gujranwala Board Answer No: 1 (A)

B) Two Examples in Humans: -

1. Human Height

2. Skin Color of Human

SARGODHA BOARD QUESTIONS

1. Explain sex determination in *Drosophila*.

(Sargodha Board-2010-

A)

2. Differentiate between polygenic and multifactorial traits.

(Sargodha Board-2010-

A)

3. What are sex-influenced traits? Give example.

(Sargodha Board-2011-

A)

4. Give the importance of test cross.

(Sargodha Board-2011-

A)

5. Differentiate between protanopia and tritanopia.

(Sargodha Board-2011-

A)

6. What do you know about erythroblastosis foetalis?

(Sargodha Board-2012-

A)

7. Define poly gene and explain briefly their functions.
(Sargodha Board-2012-

A)

8. Differentiate between protonopia and deuteranopia.
(Sargodha Board-2012-

A)

9. Give the concept of genes and alleles.

(Sargodha Board-2013-

A)

10. Give the importance of test cross by giving example.
(Sargodha Board-2013-

A)

11. Define recombination frequency. How it can be calculated.
(Sargodha Board-2013-

A)

12. Define Law of Independent Assortment.

(Sargodha Board-New Scheme-2014-

A)

13. Explain over dominance.

(Sargodha Board-New Scheme-2014-

A)

14. What is Bombay phenotype?

(Sargodha Board-New Scheme-2014-

A) Answers

1. Sex Determination in *Drosophila*: -

1. The fruit fly, *Drosophila*, has eight chromosomes in the form of four homologous pairs.

2. T.H. Morgan noticed that male and female

Drosophila

have differences in the chromosomes.

3. Morgan found that three pairs of chromosomes in male as well as female fly were similar and were called as autosomes.

4. Morgan also found that female *Drosophila* had both the chromosomes of the 4th pair similar and rod shaped
(i.e X chromosomes).

5. On the other hand, male had both the chromosomes different from each other. One chromosome was rod shaped (X chromosome) and other was j or hooked shaped (Y).

6. X and Y chromosomes are called sex chromosomes because these have genes for determination of sex.

7. *Drosophila* fly getting XX will be a female and that receiving XY will be a male.

2. Differences between Polygenic and Multifactorial Traits: -

3. Sex-influenced Traits with Example: -

See Lahore Board Answer No 3

4. Importance of Test Cross: -

See Multan Board Answer No: 9

5. Differences between Protanopia and Tritanopia: -

Tritanopia	Protanopia
1. It is blue blindness.	1. It is red blindness.
2. In tritanopia blue opsin (blue light absorbing protein) is lacking in cone cells in the retina.	2. In protanopia red opsin is lacking in cone cells in the retina.
3. It is caused due to mutation in the blue opsin gene present on autosome	3. It is caused due to mutation in the red opsin gene present on X chromosome.
7.	

6. Erythroblastosis Foetalis: -

See Gujranwala Board Answer No: 6.

7. A) Polygene: -

The genes controlling polygenic traits are called polygenes. Or

Polygenes are alleles of two or more gene pairs at different loci influencing the same trait in an

additive way.

B) Functions of Polygene: -

1. Each polygene has a small positive or negative effect

on the character.

2. Polygenes supplement each other and sum of positive

or negative effects of all individual genes produce quantitative phenotype of a continuously varying

trait.

8. Differences between Protanopia and Deuteranopia:

Protanopia	Deuteranopia
1. It is red blindness.	1. It is green blindness.
2. In protanopia red opsin (red light absorbing protein) is lacking in cone cells in the retina.	2. In deuteranopia green opsin is lacking in cone cells in the retina.

9. A) Concept of Genes: -

- Genes are basic units of biological informations in heredity.
- Genes are actually part of DNA comprising its base sequence.
- Position of a gene on the chromosome is called its locus.
- Genes are responsible for producing startling inherited

resemblances as well as distinctive variations among generations. When these pass in the form of intact parental combination between generations, inherited similarities are conserved; but when these suffle, mutate or juggle with each other, variations emerge.

5. Gene form pairs on pairs of homologous chromosomes. One member of a gene pair is located on one homologue, and other member on other homologue.

B) Concept of Alleles: -

- Partners of a gene pair are called alleles.
- Each allele of a gene pair occupies the same gene locus on its respective homologue.
- Both alleles on one gene locus may be identical, or different from each other.

10. Importance of Test Cross with Example: -

Offspring that show the dominant character are alike phenotypically but may be either homozygous or heterozygous for that character. To determine their genotype test cross is used. It helps in determining the

homozygosity or heterozygosity of the dominant parent.

- A phenotypically round seed could be homozygous (RR) or heterozygous (Rr).
- In the test cross, round seed plant with unknown genotype is crossed with a know homozygous

recessive, rr (wrinkled). The plant with wrinkled seeds

will produce gametes with only the recessive r allele.

- A round homozygote, RR, will produce only R gametes. Thus, if the plant is RR, all the offspring from the test cross will be round heterozygotes, Rr.
- Half the gametes from a round seeded Rr, plant would

carry the R allele and half would have the r allele. Thus, if plant with round seed is Rr, half of the offspring from the test cross will, on average, be wrinkled homozygotes, rr, and half will be round heterozygotes, Rr.

11. **A) Recombination Frequency: -**
It is the proportion of number of recombinants between two gene pairs as compared to total number of offspring and is given by:

$$\frac{\text{Number of recombinants}}{\text{Total number of offspring}} \times 100$$

B) Calculation of Recombination Frequency: -

Recombination frequencies between two linked genes

can be calculated by back crossing the heterozygote to

a homozygous double recessive.

12. Law of Independent Assortment: -

- It states that alleles of a gene controlling one trait assort into gametes independently of alleles of another gene controlling a different trait.
- Mendel crossed pure-breeding round yellow seed plants with true breeding wrinkled green seed plants. All of the F₁ were round yellow seed plants. When

F₁ plants were allowed to self pollinate, the F₂ consisted of:

- 9 : Round Yellow
- 3 : Round Green
- 3 : Wrinkled Yellow
- 1 : Wrinkled Green

Using the symbols, R for round, r for wrinkled, Y for yellow and y for green then Mendel's cross can be summarized as:

Parents
YYRR x yyrr
yellow round green wrinkled
F₁ generation (all YyRr genotype, yellow round phenotype)

The cross that produces the F₂ generation is therefore:

YyRr x YyRr
The ratio of the phenotypes of this cross, with the possible genotypes indicated are:
F₂ generation

- YYRR & YYRr & YyRR & YyRr --- 9 yellow round
- YYrr & Yyrr ----- 3 yellow wrinkled
- yy RR & yy Rr --- 3 green round
- yyrr ----- 1 green wrinkled

13. Over Dominance: -

See Gujranwala Board Answer No: 12

14. Bombay Phenotype: -

See Multan Board Answer No: 2

DERA GHAZI KHAN BOARD QUESTIONS

1. Define polygene. (D.G.K. Board-2009-A)
2. What do you know about crossing over? (D.G.K. Board-2009-A)
3. Name two major types of Diabetes. (D.G.K. Board-2009-A)
4. What is over dominance? (D.G.K. Board-2010-A)
5. What is sex influenced trait and MODY? (D.G.K. Board-2010-A)
6. Define incomplete dominance. Give example. (D.G.K. Board-2011-A)
7. What is erythroblastic foetalis? (D.G.K. Board-2011-A)
8. Define polygenic inheritance. Give example. (D.G.K. Board-2011-A)
9. Define polygenic traits. (D.G.K. Board-Group-I-2012-A)
10. Define SRY gene. (D.G.K. Board-Group-I-2012-A)
11. Define crossing over. Give the significance of cross over frequency. (D.G.K. Board-Group-I-2012-A)
12. Define gene pool. (D.G.K. Board-Group-I-2012-A)
13. Explain MODY. (D.G.K. Board-Group-II-2012-A)
14. What are sex-influenced traits? (D.G.K. Board-Group-II-2012-A)
15. Define nullo gametes. (D.G.K. Board-Group-II-2012-A)
16. Define phenotype with example. (D.G.K. Board-Group-I-2013-A)
17. State co-dominance with example. (D.G.K. Board-Group-I-2013-A)
18. What is Rh-factor? Why it is named so, also mention its discoverer. (D.G.K. Board-Group-I-2013-A)
19. Define pleiotropy. Give two examples. (D.G.K. Board-Group-II-2013-A)
20. Differentiate between genotype and phenotype. (D.G.K. Board-Group-II-2013-A)
21. What is test cross? Give its significance. (D.G.K. Board-Group-II-2013-A)
22. What is universal blood donor?

(D.G.K. Board-New Scheme-Group-I-2014-

- A)
23. Differentiate between genotype and phenotype. (D.G.K. Board-New Scheme-Group-I-2014-A)
24. What is MODY? Write its causes. (D.G.K. Board-New Scheme-Group-I-2014-A)
25. What are sex-limited traits? (D.G.K. Board-New Scheme-Group-II-2014-A)
26. What is MODY? (D.G.K. Board-New Scheme-Group-II-2014-A)
27. What is the risk of color blind child in family when father is color blind and mother is normal? (D.G.K. Board-New Scheme-Group-II-2014-A)
28. Define Y-linked trait with one example. (D.G.K. Board-New Scheme-Group-I-2015-A)
29. What is MODY? (D.G.K. Board-New Scheme-Group-I-2015-A)
30. Differentiate between sex chromosomes and autosomes. (D.G.K. Board-New Scheme-Group-I-2015-A)
31. What are opsins? (D.G.K. Board-New Scheme-Group-II-2015-A)
32. What is Hemophilia? (D.G.K. Board-New Scheme-Group-II-2015-A)
33. What is Hypophosphatemic Rickets? (D.G.K. Board-New Scheme-Group-II-2015-A)

Answers

1. **Polygene: -**
See Sargodha Board Answer No: 7
2. **Crossing Over: -**
See Lahore Board Answer No: 4
3. **Names of Two Major Types of Diabetes: -**
 - a. Type I or Insulin Dependent Diabetes Mellitus (IDDM)
 - b. Type II or Non Insulin Dependent Diabetes Mellitus (NIDDM)
4. **Over Dominance: -**
See Gujranwala Board Answer No: 12
5. **A) Sex Influenced Trait: -**
 1. It is a genetic trait that is expressed differentially in males and females.
 2. It occurs between males and females but it is more common in one sex.
 3. It is controlled by an allele that is expressed as dominant in one sex but recessive in other.
 4. For example, pattern baldness is a sex-influenced trait.
- B) **MODY: -**
 1. MODY means maturity onset diabetes of the young.
 2. It is the form of diabetes mellitus type II which is developed before 25 years of age.

3. About 2 % - 5 % of type II diabetics develop MODY.
4. MODY can be inherited as an autosomal dominant trait.
6. **A) Incomplete Dominance: -**
When the phenotype of heterozygote is intermediate between phenotypes of the two homozygotes, it is called incomplete or partial dominance.
- B) Example: -**
In Four O' clock, flower color is controlled by single gene with two alleles. A cross between a homozygous red-flowered Four O' clock and a homozygous white colored Four O' clock will pink F_1 heterozygotes. When these F_1 plants are self-pollinated, they produce an F_2 generation containing a mixture of red-, pink- and white flowered plants in the ratio 1:2:1.
7. **Erythroblastic Foetalis: -**
See Multan Board Answer No: 31
8. **A) Polygenic Inheritance: -**
Polygenic inheritance is the inheritance involving characters that are under the control of several or many gene loci.
- B) Example: -**
Wheat grains vary in color from white to dark red. In wheat, when plants that produce white seeds are crossed with plants that produce dark red seeds, the F_1 plants are intermediate in color i.e. light red. If the F_1 plants are allowed to self-pollinate, the F_2 plants produce seeds having one of the seven shades of color in the following ratio:
1 : dark red : 6 moderately dark red : 15 red : 20 light red : 15 pink : 6 light pink : 1 white.
These results can be explained by assuming that color of seeds is controlled by genes at three different loci and that each dominant allele contributes a small but equal effect to the phenotype.
9. **Polygenic Traits: -**
See Gujranwala Board Answer No: 1
10. **SRY Gene: -**
1. It is the gene involved in determination of maleness in humans.
 2. Its name SRY stands for sex determining region of the Y chromosome.
 3. It is located at the tip of short arm of Y-chromosome.
 4. SRY gene acts as "genetic switch" that causes testes to develop in the fetus. The developing testes then secrete the hormone testosterone that causes other male characteristics to develop.
11. **A) Crossing Over: -**

- Crossing over is an exchange of segments between non-sister chromatids of homologous chromosomes.
- B) Significance of Cross Over Frequency:**
Crossover frequency determines the happening of crossing over. The lower the cross over frequency, closer together are two genes, the less likely it is that a crossing over will occur between them.
12. **Gene Pool: -**
See Exercise Chapter No: 22 Answer No: 2
13. **MODY: -**
See Exercise Chapter No: 22 Answer No: 14
14. **Sex-Influenced Traits: -**
See Lahore Board Answer No: 3
15. **Null Gametes: -**
A gamete without any sex chromosome is known as null gamete.
Example: -
Half of the male gametes of Grasshopper and *Protenor* bug are null gametes without any sex chromosome.
16. **A) Phenotype: -**
The word phenotype refers to the physical appearance of the individual.
- B) Example: -**
The pea plants with both genotypes TT and Tt show the dominant phenotype and are tall, while the pea plants with tt genotype show recessive phenotype and are short.
17. **Codominance with An Example: -**
See Rawalpindi Board Answer No: 10
18. **A) Rh-factor: -**
1. Rh-factors are red blood cell antigens, also called D antigens, first identified in Rhesus monkeys.
 2. People who have these antigens are Rh+, while people lacking them are Rh⁻.
 3. Rh-factor is encoded by three genes C, D and E, which occupy the two tightly linked loci. Alleles of gene D occupy one locus called D locus, while genes C and E alternately occupy the other locus.
 4. The D locus is of prime importance. D gene has two alleles, D and d. D is completely dominant over d. Persons having genotype DD or Dd have Rh-factor on their RBC and are Rh+. Persons with genotype dd do not have Rh factor and are Rh⁻.
- B) Why Rh-factor Named So: -**
Rh-factor is named Rh after Rhesus monkey, because its antigen was first discovered in rhesus monkeys.
- C) Discoverer of Rh-factor: -**
Rh-factor was discovered by Landsteiner in 1930's
19. **A) Pleiotropy: -**
1. Pleiotropy is a condition in which a single gene has more than one effect on production of phenotype.
 2. The gene with multiple phenotypic effect is called pleiotropic.

B) Two Examples of Pleiotropy: -

1. White eye gene in *Drosophila* also affects the shape of sperm storing organs (spermathecae)
2. Genes that affect growth rate in humans also influence both weight and height.

20. Differences between Genotype and Phenotype: -

See Exercise Chapter No: 22 Answer No: 1 (a)

21. Test Cross and its Significance: -

See Multan Board Answer No: 4

22. Universal Blood Donor: -

See Exercise Chapter No: 22 Answer No: 11

23. Differences between Genotype and Phenotype: -

See Exercise Chapter No: 22 Answer No: 1 (a)

24. MODY and its Causes: -

See Gujranwala Board Answer No: 16

25. Sex-limited Traits: -

1. Sex-limited traits are limited to only one sex due to anatomical differences.
2. Sex-limited trait affects a structure or function of the body present in only males or only females.
3. These traits may be controlled by sex-linked or autosomal genes.

Examples: -

- a. Genes for milk yield in dairy cattle affect only cows.
- b. Beard growth in humans is limited to men. A woman does not grow a beard herself but she can pass the genes specifying heavy beard growth to her sons.

26. MODY: -

See Exercise Chapter No: 22 Answer No: 14

27. Activity: -

The risk of color blind child in family, when father is color blind and mother is normal, is zero percent.

28. Y-linked Trait with an Example: -

1. The trait whose genes are present on Y chromosome is called Y-linked trait.
2. Maleness in humans is a Y-linked trait.
3. SRY gene located at the tip of short arm of Y chromosome determines maleness in man. It is a male sex switch which triggers developmental process towards maleness after 6 week pregnancy.

4. Pattern of Y-linked inheritance is very peculiar. Y-linked trait passes through Y-chromosome from father to his son only. Such traits cannot pass to daughters because they do not inherit Y-chromosome.

All sons of an affected father are affected by a Y-linked trait.

9. MODY: -

See Exercise Chapter No: 22 Answer No: 14

30. Differences between Sex chromosomes and Autosomes: -

See Exercise Chapter No: 22 Answer No: 1 (c)

31. Opsins: -

1. Opsins are specific light absorbing proteins in cone cells of retina.
2. There are three types of opsins referred to as blue

green and red opsins, each is specific for specific light.

3. There are also three different kinds of cone cells, each having only one of the three types of opsins (blue opsin, green opsin or red opsin), hence are sensitive to only one of the three primary colors, blue, green or red.

4. The genes for red and green opsins are on X chromosome, while the gene for blue opsin is present on autosome number 7.

5. A normal person has trichromatic color vision based on presence of all three types of opsins and hence three types of cone cells in the retina.

6. Mutation in opsin genes cause three types of color-blindness.

32. Hemophilia: -

See Rawalpindi Board Answer No: 2 (A)

33. Hypophosphatemic Rickets: -

See Multan board Answer No: 32

SAHIWAL BOARD QUESTIONS

1. What are multiple alleles? (Sahiwal Board-3013-A)

2. Differentiate between Autosome and sex-chromosome. (Sahiwal Board-3013-A)

3. What is polygenic inheritance? (Sahiwal Board-3013-A)

4. Differentiate between gene and allele. (Sahiwal Board-Old Scheme-2014-A)

5. What is linkage group? (Sahiwal Board-Old Scheme-2014-A)

6. An Rh- woman is married to an Rh+ man whose father was also Rh-. What is the probable risk of erythroblastosis foetalis in their babies. (Sahiwal Board-Old Scheme-2014-A)

7. What is Test Cross? Give its significance. (Sahiwal Board-New Scheme-2014-A)

8. What are sex-linked traits? Give example. (Sahiwal Board-New Scheme-2014-A)

9. Differentiate between phenotype and genotype. (Sahiwal Board-New Scheme-2014-A)

10. Differentiate between genotype and phenotype. (Sahiwal Board-New Scheme-2015-A)

11. Enlist the types of color blindness. (Sahiwal Board-New Scheme-2015-A)

12. Discuss the results of reciprocal cross of Morgan's series of experiments on *Drosophila*. (Sahiwal Board-New Scheme-2015-A)

A)

Answers

- Multiple Alleles: -**
See Bahawalpur Board Answer No: 13
- Differences between Autosome and Sex-Chromosome: -**
See Exercise Chapter No: 22 Answer No: 1 (c)
- Polygenic Inheritance: -**
See D.G.K Board Answer No: 8
- Differences between Gene and Allele:-**
See Exercise Chapter No: 22 Answer No: 1 (g)
- Linkage Group: -**
See Multan Board Answer No: 10
- Activity: -**
When an Rh- woman is married to an Rh+ man whose father was also Rh, the probable risk of erythroblastosis foetalis in their babies is fifty percent.
If allele for rh factor is represented by D and the allele which does not code Rh factor by d, genotype of rh woman will be dd and her husband will be Dd. The probability of Rh+ and Rh- offspring will be:

Woman: dd, Man: Dd
Gametes: d, d, D, d
Offspring: Dd (Rh+), dd (Rh-)

Rh+ babies are on the risk of erythroblastosis while Rh- offspring are not on such risk. Hence there is 50 % chance of erythroblastosis foetalis in their babies.
- Test Cross and its Significance: -**
See Multan Board Answer No: 4
- A) Sex-linked Traits: -**
 - A trait whose genes are present on sex chromosomes is called sex-linked trait.
 - In mammals almost all sex-linked genes are borne on the X chromosome and Y chromosome is lacking for these alleles. It is more appropriate, however to refer to sex-linked traits as X-linked traits.
 - Hence sex-linked trait, more appropriately X-linked trait is defined as the trait that is determined by a gene on the X chromosome and absent on Y chromosome.

Or
A trait determined by gene on the X chromosome is said to be sex-linked (X-linked).
- Sex-linked traits follow the transmission of X chromosome. A female receives one X chromosome from her mother and one X from her father. A male receives his Y chromosome, which makes him male, from his father. From his mother he inherits a single X chromosome and therefore all his X-linked genes. In the male, every allele present on the X chromosome is expressed because he has only one copy of each X linked gene, whether the allele was dominant or

recessive in the female parent

- Example: -**
Red-green color blindness, hemophilia etc.
- Differences between Phenotype and Genotype: -**
See Exercise Chapter No: 22 Answer No: 1 (a)
- Differences between Genotype and Phenotype: -**
See Exercise Chapter No: 22 Answer No: 1 (a)
- List of the Types of Color Blindness: -**
 - Protanopia ----- Red blindness
 - Tritanopia ----- Blue blindness
 - Deutanopia ---- Green blindness
 - Blue cone monochromacy -- Red and green blindness

- Results of Reciprocal Cross of Morgan's Series of Experiments on Drosophila: -**
When Morgan mated a white-eyed female a red eyed male (a reciprocal cross), he found that all the female

offspring had red eyes while all the male offspring had white eyes.

White eyed female X^wX^w × Red eyed male $X^{w+}Y$

Eggs: X^w, X^w Sperms: X^{w+}, Y

F₁: $X^{w+}X^w$ (All red eyed females), X^wX^w (All white eyed males)

When these F₁ red eyed females and white eyed males were mated to produce F₂. Half of the F₂ females had red eyes, half had white. Similarly half of the F₂ males had red eyes and half had white.

F₁ $X^{w+}X^w$ × F₁ X^wY

Eggs: X^{w+}, X^w Sperms: X^w, Y

F₂: $X^{w+}X^w$ (50% Red eyed Females), X^wX^w (50% White eyed Females), $X^{w+}Y$ (50% Red eyed Males), X^wY (50% White eyed Males)

C h a p t e r ----

23

BIOTECHNOLOGY

2 SQs

I) From Exercise:-
Questions

1. How and why transgenic animals that secrete a product are often cloned?
2. Explain two primary goals of Human Genome Project.
What are possible benefits of the project?
3. Explain and give examples of ex vivo and in vivo gene therapies in humans.

Answers

1. A) How: -

Following steps take place cloning of transgenic animals:

- a. 2n nuclei of transgenic animal (goat) are transferred into enucleated donor eggs by microinjection.
- b. These eggs are then transferred into the uterus of host goats where development occurs.
- c. Host goats give birth to cloned transgenic goats which produce biotechnology product in their milk.

B) Why: -

Transgenic animals are often cloned to obtain the product in a very large scale.

2. A) Two Primary Goals of Human Genome Project:

1. The first primary goal of HGP is to construct a genetic map of the human genome.
2. The second goal is to construct a base sequence map.

B) Possible Benefits of Human Genome Project: -

HGP will make possible one day to treat certain human ills by administering normal genes or their protein products to those who suffer from a genetic disease. Or

1. It will reveal the methodology for early diagnosis, better treatment and even prevention of genetic diseases.
2. In the area of basic science, the genomic information of human and other species will greatly help to understand the genomic organization, the control of gene expressions, cellular growth and differentiation and evolutionary biology.

3. A) Ex-Vivo Therapy with Example: -

1. In Ex-vivo gene therapy, cells are modified outside the body and then transplanted back in again.
2. Following steps take place in Ex-vivo gene therapy:
 - a. Bone marrow stem cells are removed.
 - b. These bone marrow stem cells are infected with a retrovirus carrying a normal gene to bring it into bone marrow stem cells.
- c. Genetically engineered bone marrow stem cells are returned to patients. The patients usually show better improvement after this therapy.

Example: -

The first complete cure of Severe Combined Immunodeficiency Syndrome (SCID) was achieved

in 2000 in Paris through Ex-vivo gene therapy.

B) In-Vivo Therapy with Example: -

1. In In-vivo gene therapy, genes are inserted into cells in the body.
2. An In-vivo method of treatment is being tried in case of cystic fibrosis (a heredity disease in which often die due to numerous infections of the respiratory tract). Liposomes-microscopic vesicles (that spontaneously form when lipoproteins are put into a solution) have been coated with the gene needed to cure cystic fibrosis. Then the solution is sprayed into patients's nostrils. Due to limited gene transfer, this methodology has not yet been successful.

II) From Punjab Boards:- LAHORE BOARD QUESTIONS

1. What is restriction enzyme? (Lahore Board-2008-A)
2. What are transgenic animal? (Lahore Board-2008-A)
3. What are restriction enzymes? (Lahore Board-2009-A)
4. Define transgenic organisms. (Lahore Board-2009-A)
5. Explain the importance of gene sequencing. (Lahore Board-2010-A)
6. Differentiate between ex-vivo and in-vivo gene therapy. (Lahore Board-2010-A)
7. What are transgenic plants? (Lahore Board-2011-A)
8. What is restriction enzyme? (Lahore Board-2011-A)
9. Give three possible ways to get the gene of interest. (Lahore Board-Group-I-2012-A)
10. What is the role of molecular carrier-the vector? (Lahore Board-Group-II-2012-A)
11. Mention the role of Lambda phage during recombinant DNA technology. (Lahore Board-Group-I-2013-A)
12. What is role of suicide gene in transgenic bacteria? (Lahore Board-Group-I-2013-A)
13. What is Biodegradable Plastic and-its origin? (Lahore Board-Group-I-2013-A)
14. What are palindromic sequences? (Lahore Board-Group-I-2013-A)
15. Define genome and genomic library. (Lahore Board-Group-I-2013-A)
16. What are uses of PCR amplification and analysis? (Lahore Board-Group-I-2013-A)
17. What is probe? Give its use.

(Lahore Board-New Scheme-Group-I-2014-
A)

18. Differentiate between plasmids pSC 101 and pBR322.

(Lahore Board-New Scheme-Group-I-2014-
A)

19. What is totipotent?

(Lahore Board-New Scheme-Group-II-2014-
A)

20. What are transgenic plants?

(Lahore Board-New Scheme-Group-II-2014-
A)

Answers

1. Restriction Enzyme: -

1. It is an enzyme that cleaves a DNA duplex molecule at a particular base sequence, usually within or near a

palindromic sequence.
It is also called restriction nuclease.

2. Transgenic Animal: -

1. Animal in which foreign genes have been incorporated is referred to as transgenic animal.

2. Transgenic animals are usually produced by injecting the DNA of a particular gene into the nucleus of a fertilized egg cell or of embryonic stem cells.
3. Another method of producing transgenic animals is the use of viruses as recombinant DNA vectors. RNA viruses called retroviruses make DNA copies of themselves by reverse transcription. Sometimes DNA copies become integrated into the host chromosomes, where they are replicated along with host DNA.

2. Transgenic animals provide valuable applications over a wide range research area, such as regulation of gene expression, immune system function, genetic diseases, viral diseases, and genes involved in the development of cancer.

3. Restriction Enzymes: -

1. Restriction enzymes are natural enzymes of bacteria, which they use for their own protection. They cut down the viral DNA but do not harm the bacterial chromosome. They are called restriction enzymes because they restrict the growth of viruses.

2. In 1970, Hamilton O. Smith, at Johns Hopkins University, isolated first restriction enzyme. So far

more than 400 such enzymes have been isolated, out of which about 20 are frequently used in recombinant DNA technology.

3. Restriction enzymes cut the DNA at palindromic sequences (specific sequences of four or six nucleotides arranged symmetrically in the reverse

order).

4. EcoRI, a commonly used restriction enzyme, cuts double-stranded DNA when it has GAATTC (a palindromic sequence) at the cleavage site.

4. Transgenic Organisms: -

1. Transgenic organisms are free-living organisms in the

environment that have had a foreign gene stably inserted into them. Or

Organisms that have a foreign gene inserted into them are called transgenic organisms. Or

These are organisms resulting from in vitro transfer of DNA from other species. Or

The organisms with stably integrated foreign genes are called transgenic organisms.

2. The genes which are transplanted into transgenic organisms can be passed on to successive generations.

3. Transgenic organisms may be animals, plants, fungi or bacteria.

5. Importance of Gene Sequencing: -

Knowing the base sequence of normal gene may make

it possible one day to treat certain human ills by administering normal genes and or their protein products to those who suffer from a genetic disease.

6. Differences between Ex-Vivo and In-Vivo Gene Therapy: -

Ex-Vivo Gene Therapy	In-Vivo Gene Therapy
1. In Ex-vivo gene therapy, normal genes are inserted into the cells outside the body usually through retroviruses that are then transplanted back in again.	1. In In-vivo gene therapy, genes are inserted into cells in the body.
2. For the treatment of SCID, ex-vivo gene therapy is used.	2. For the treatment of Cystic fibrosis in-vivo gene therapy is used.

7. Transgenic Plants: -

1. The plant in which foreign genes have been incorporated is referred to as transgenic plant.

2. Techniques have developed to introduce foreign genes into immature plant embryos or into plant cells called

protoplast that have had the cell wall removed.

3. Transgenic plants are increasingly important in agriculture. Foreign genes transferred to cotton, corn,

potato strains have been made plants resistant to pests.

4. Plants are also being engineered to produce proteins, such as hormones, clotting factors, and antibodies in their seeds.

8. Restriction Enzyme: -

See Lahore Board Answer No: 3

9. Three Possible Ways to Get the Gene of Interest: -

1. To isolate gene of interest from the chromosomes by using restriction endonucleases.

2. To synthesize it chemically in the laboratory.

3. To make it from mRNA, using reverse transcriptase.

10. Role of Molecular Carrier-the Vector: -

It is a DNA molecule in which gene of interest is inserted to construct a recombinant DNA (rDNA). It is

capable of replication in host organism. It acts as a vehicle to transport recombinant DNA (rDNA) into host cell. It may be circular DNA (plasmid) of bacterium or DNA of a phage virus.

11. Role of Lambda Phage During Recombinant DNA

Technology: -

DNA of lambda phage is used as a vector. After lambda phage attaches a host bacterium, DNA bacterium is released from the virus and enters the bacterium. Here, it will direct the reproduction of many more viruses, each virus in bacteriophage clone

contains a copy of gene being cloned.

12. Role of Suicide Gene in Transgenic Bacteria: -

Suicide genes given to bacteria cause them to self-destruct when the job given to bacteria had been accomplished.

13. A) Biodegradable Plastic: -

Biodegradable plastic is made up of polyhydroxybutyrate.

B) Origin of Biodegradable Plastic: -

It is originated from a genetically engineered weed called mouse-eared crest in cell granules.

14. Palindrome Sequences: -

1. It is nucleotide sequence that is identical to its complementary strand when each is read in a same chemical direction.

2. For example, GATC
5'-----GATC-----3'
3'-----CTAG-----5'

15. A) Genome: -

A genome is a full set of genes of an individual.
Or

The entire genetic material of an organism is called its genome. Or

A genome is the total genetic content of any cell in an organism. It consists of all the genes on all the chromosomes. It also includes all the DNA on the non-coding sections. Or

1. The sum of all the genetic information of an organism, stored as its DNA sequence, is termed the genome.
2. The genome includes all genes carried by an organism and also contain DNA sequences that do not encode genes.

3. Genomes are typically organized into long stretches of

linear or circular DNA contained in chromosomes.

4. Genome can contain from one to a large number of different types of chromosomes. Human genome, for example, is the totality of genetic information in human cells and includes DNA content of both

nucleus and mitochondria. It consists of upto 40000 genes distributed between 46 chromosomes.

B) Genomic Library: -

1. A genomic library is a collection of bacterial or bacteriophage clones, each clone containing a particular segment of DNA from the source cell.
2. The entire collection of bacterial or bacteriophage clones contains all the genes of that organism.
3. For making a genomic library, an organism's DNA

is simply spliced up into pieces, and pieces are put into vector (plasmids or viruses) that are taken up by bacteria.

16. Uses of PCR Amplification and Analysis: -

PCR amplification and analysis can be used to:

a. To diagnose viral infections, genetic disorders, and cancer

b. In forensic laboratories to identify criminals

c. To determine evolutionary history of human population; it has been possible to sequence

DNA taken from a 76,000 years old mummified human brain and from a 17 to 20 million years old plant fossil following PCR amplification.

17. A) Probe: -

1. A probe is a single stranded DNA with nucleotide sequence that will hybridize (pair) with a certain piece of DNA.

2. Location of the probe is possible because the probe is either radioactive or fluorescent.

B) Use of Probe: -

A particular can be used to search a genetic library for

a certain gene. Bacterial cells, each carrying a particular DNA fragment, can be plated onto agar in a

petri dish. After the probe hybridizes into the gene of interest, genes can be isolated from the fragment.

18. Differences between Plasmids pSC 101 and pBR322: -

pSC101	pBR322
1. It is a plasmid that has antibiotic resistance gene for tetracycline.	1. It is a plasmid that has antibiotic resistance genes for tetracycline as well as ampicillin.
2. It is a smaller plasmid.	2. It is a larger plasmid.

19. Totipotent: -

1. Totipotent means each cell has full genetic potential of the organism.

2. German botanist Gottlieb Haberlandt said that plant cells are totipotent.

3. As each cell of the plant has the full genetic potential of the organism, hence single cell of a plant could become a complete plant.

20. Transgenic Plants: -

See Lahore Board Answer No: 7

GUJRANWALA BOARD QUESTIONS

1. What are restriction enzymes?
(Gujranwala Board-2008-A)
2. Define protoplast.
(Gujranwala Board-2008-A)
3. What are palindromic sequences?
(Gujranwala Board-2009-A)
4. What are possible benefits of human genome project?
(Gujranwala Board-2009-A)
5. Discuss the role of prob.
(Gujranwala Board-2010-A)
6. What are restriction enzymes?
(Gujranwala Board-2010-A)
7. Explain the transgenic organisms.
(Gujranwala Board-2010-A)
8. What is meant by totipotent?
(Gujranwala Board-2011-A)
9. For which the abbreviation of SCID is used?
(Gujranwala Board-2011-A)
10. Elaborate molecular carriers. Give examples.
(Gujranwala Board-2012-A)
11. What is gene therapy?
(Gujranwala Board-2013-A)
12. Define Genetic Engineering.
(Gujranwala Board-2013-A)
13. Give two uses of DNA finger printing.
(Gujranwala Board-2013-A)
14. Differentiate between Sanger's method and Maxam Gilbert method of Gene Sequencing.
(Gujranwala Board-2013-A)
15. What is aspartame?
(Gujranwala Board-2013-A)
16. Explain transgenic organisms.
(Gujranwala Board-New Scheme-2014-A)
17. What is cystic fibrosis?
(Gujranwala Board-New Scheme-2014-A)
18. What are bioreactors?
(Gujranwala Board-New Scheme-2014-A)
19. What is gene therapy?
(Gujranwala Board-New Scheme-2014-A)
20. Differentiate between genome and probe.
(Gujranwala Board-New Scheme-2015-A)

21. Define biotechnology. What are transgenic organisms?
(Gujranwala Board-New Scheme-2015-A)

Answers**1. Restriction Enzymes: -**

See Lahore Board Answer No: 3

2. Protoplast: -

1. The plant cell that have had the cell wall removed is called protoplast.
2. Plant protoplasts are more easily transformed with foreign DNA causing using approaches such as electroporation.
3. In addition plant protoplasts isolated from different plants can be forced to fuse together to form a hybrid.

3. Palindromic Sequences: -

1. These are the specific sequences of four or six nucleotides arranged symmetrically in the reverse order.
2. Specific restriction enzymes cut the DNA at specific palindromic sequences.
3. EcoRI, a commonly used restriction enzyme, cuts the double stranded DNA when it has GAATTC palindromic sequence of bases at the cleavage site.
GAATTC e.i., 5'----- GAATTC ---- 3'
3'----- CTTAAG ---- 5'

4. Possible Benefits of Human Genome Project: -

1. Identification of defective genes and hence the opportunity to offer early treatment.
2. Identification of genes which confer a susceptibility to certain diseases and so enable individuals to take preventive measures.
3. Prediction of the proteins that the genes produce, giving an opportunity to design appropriate drugs to enhance or inhibit the activities of these genes. Or
1. It should lead to better understanding of genetic disease and may in some cases open the way to therapy.
2. Many diseases are the result of interaction between genes and environment. A detailed knowledge of the genes involved may enable people whose genes place them at risk to reduce their risk.
3. Comparison with the genomes of other species should shed light on our own evolution.

5. Role of Probe: -

The role of probe is the search of gene in the genomic library as it hybridizes---becomes attached by base pairing---to complementary base sequences in the target gene. The probe is then detected by radioautography using x-ray-film.

6. Restriction Enzymes: -

See Lahore Board Answer No: 3

7. Transgenic Organisms: -

See Lahore Answer No: 4

8. Totipotent: -

1. A totipotent is a cell that possesses the full genomic potential of the organism.
2. A totipotent cell has a full set of hereditary instructions

- and can generate an entire adult individual.
- Plant cells are totipotent. This means that they can, under the correct chemical conditions, grow into entire plant.
 - Any gene transferred into a single plant cell can therefore be transmitted into next generation.

9. SCID is Abbreviated For: -

SCID is abbreviated for severe combined immunodeficiency syndrome.

10. A) Molecular Carriers: -

To propagate gene of interest, a molecular carrier called vector is required on which gene of interest could be placed. The vector can enter and replicate in the host.

B) Examples: -

The most commonly used vectors are:

a. Plasmids: -

Plasmids are small extrachromosomal DNAs of bacteria that are used as molecular carrier (vector). Plasmids have two properties vitally important in their role as cloning vectors.

- They can be taken by other bacteria, even of other species.
- They contain genes for antibiotic resistance, which can

be used as markers to identify their presence.

Commonly used plasmids are pBR322 and pSC101.

b. Bacteriophages or Phages: -

Phages are viruses that infect bacterial cells. One much used phage is phage lambda.

11. Gene Therapy: -

See Gujranwala Board Answer No: 19

12. Genetic Engineering: -

- Genetic engineering is the methodology of altering the genetic constitution of an organism by modifying its own genes or introducing genes from a different species.

Or

Genetic engineering is the manipulation of genetic material of organisms. Or Genetic engineering is an array of techniques that facilitate the manipulation and duplication of pieces of DNA for industrial, medical and research

purposes.

- Over the past decades, the development of new and powerful techniques called genetic engineering or DNA recombinant technology for studying and manipulating DNA has revolutionized genetics.

These

techniques have allowed biologists to intervene directly in the genetic fate of organisms for the first time.

- There are four stages of a genetic engineering experiments:

- DNA cleavage
- Production of Recombinant DNA
- Cloning
- Screening

13. Two Uses of DNA Finger Printing: -

- DNA fingerprinting is used to settle disputes over

parentage and other relationships.

- It is also used to identify criminals from blood, semen, saliva, hair follicles etc. left at the scene of a crime.

14. Differences between Sanger's Method and Maxam Gilbert Method of Gene Sequencing: -

15. Aspartame: -

- Aspartame is a dipeptide sweetener better known as Nutrasweet.
- It is made from an organic chemical (compound) phenylalanine.
- Some genetically engineered bacteria are used to produce phenylalanine.

16. Transgenic Organisms: -

See Lahore Board Answer No: 4

17. Cystic Fibrosis: -

- Cystic fibrosis patients lack a gene that codes for transmembrane carrier of the chloride ion. Patients die

due to numerous functions of the respiratory tract.

- It is being treated by in-vivo gene therapy.

18. Bioreactors: -

Bioreactors are automatic large vats which produce an optimal environment for genetically engineered bacteria that make proteins for use in pharmaceutical products.

19. Gene Therapy: -

- Gene therapy is the insertion of genetic material into human cells for the treatment of a disorder.
- It includes procedures that give a patient healthy genes to make up for faulty genes.
- It also includes the use of genes to treat various other human illness such as cancer and cardiovascular diseases.
- There are two main methods used for gene therapy Ex-vivo and In-vivo.

20. Differences Between Genome and Probe: -

Genome	Probe
Genome is the entire DNA sequence of an organism.	A probe is a single stranded DNA with nucleotide sequence that will hybridize (pair) with a certain piece of DNA.

21. A) Biotechnology: -

Biotechnology is the use of a natural biological system to produce a product or to achieve an end desired by humans.

Or

- Biotechnology can be defined as the use of living organisms for the welfare of mankind.
- In broad terms, biotechnology is the manipulation of living organisms or their components to perform practical task or provide useful products.
- The building of biotechnology is standing on pillars of recombinant DNA technology (genetic engineering) – the manipulation of genetic material of any organism.

B) Transgenic Organisms: -

Transgenic organisms are free-living organisms in the environment that have had a foreign gene stably inserted into them.

MULTAN BOARD QUESTIONS

1. What is Vortex Mixing? (Multan Board-2008-A)
2. What is the use of Bioreactors? Name a few products. (Multan Board-2008-A)
3. Write the names of any four biotechnology products produced by Bacteria. (Multan Board-2008-S)
4. What is a Genomic Library? (Multan Board-2008-S)
5. Explain Transgenic Organisms. (Multan Board-2008-S)
6. What is vortex mixing? (Multan Board-2009-A)
7. What is the role of transgenic bacteria in plants? (Multan Board-2009-A)
8. What is the role of vectors in genetic engineering? (Multan Board-2009-A)
9. What are the main principles of gene sequence? (Multan Board-2009-S)
10. What is Gene pharming? (Multan Board-2010-A)
11. What is Palindromic Sequence? (Multan Board-2010-A)
12. Give two advantages of Polymerase Chain Reaction. (Multan Board-2010-A)
13. State "Gel Electrophoresis" process. (Multan Board-2010-S)
14. What is Recombinant DNA technology? (Multan Board-2010-S)
15. Discuss two goals of Human Genome Project. (Multan Board-2010-S)
16. Explain the importance of gene sequencing. (Multan Board-2011-A)
17. What are two methods of Gene Therapies in human? (Multan Board-2011-A)
18. What do you mean by palindromic Sequence? (Multan Board-2011-S)
19. Give any two uses of PCR amplification analysis. (Multan Board-2011-S)
20. What is Palindromic Sequence? (Multan Board-2012-A)
21. What is Taq Polymerase and its significance.

(Multan Board-2012-S)

22. Write the way by which Bacterial cell becomes permeable to plasmid. (Multan Board-2013-A)
23. How a certain gene can be searched present in a Genomic Library? (Multan Board-2013-A)
24. Write down two different methods in Gene Sequencing for generation of DNA fragment. (Multan Board-2013-A)
25. What is Cystic Fibrosis? (Multan Board-Old Scheme-2014-A)
26. Why Taq polymerase is used? (Multan Board-New Scheme-2014-A)
27. What are Totipotents? (Multan Board-New Scheme-2014-A)
28. What is Probe? (Multan Board-New Scheme-2015-A)
29. Write two uses of PCR. (Multan Board-New Scheme-2015-A)

Answers**1. Vortex Mixing: -**

Vortex mixing is a method in which eggs are placed in an agitator with silicon-carbide needles, and the needles make tiny holes through which the DNA can enter. When these eggs are fertilized, the resulting offspring are transgenic animals.

2. A) Use of Bioreactors: -

Bioreactors provide an optimal environment for genetically engineered bacteria to make proteins for use in pharmaceutical products.

B) Names of Few Products: -

1. Insulin
2. Human growth hormone
3. hemophilia factor VIII

3. Names of Any Four Biotechnology Products Produced by Bacteria: -

1. Hepatitis B vaccine
2. Tissue plasminogen activator
3. Human growth factor
4. Insulin

4. Genomic Library: -

1. Genomic library is a complete set of DNA sequences of an organism cut into fragments, each fragment ligated to vector DNA and transformed into host cells.

Or

A genomic library consists of all the recombinant plasmids or phage DNA molecules that were generated

by ligating DNA from the source of interest into a vector. Or

Genomic library consists of all host cells that have taken up the recombinant DNA, representing all the DNA from the source DNA.

2. Several different types of genomic libraries can be made, depending upon the nature of insert and the type of the vector used.

5. Transgenic Organisms: -

See Lahore Board Answer No: 4

6. Vortex Mixing: -

See Multan Board Answer No: 1

7. Role of Transgenic Bacteria in Plants:

1. Some transgenic bacteria have been produced to promote the health of plants. For example, bacetria that normally live on plants and encourage the formation of ice crystals have been changed from frost-plus to frost-

minus bacteria. As a result new crops such as frost-resistant strawberries are being developed.

2. A bacterium that normally colonizes the roots of corn plants has now been endowed with genes (from another bacterium) that code for an insect toxin. The toxin protects the roots from insects. Or The bacterium *Bacillus thuringiensis*, produces a toxin

which kills caterpillar and other insect larvae. The gene for the toxin has been successfully introduced into some plant species using a bacterial vector. The plants

produce the toxin and show increased resistance to attack by insect larvae. The gene is also passed on the plants' offspring.

8. Role of Vectors in Genetic Engineering: -

See Lahore Board Answer No: 10

9. Main Principles of Gene Sequence: -

1. To generate pieces of DNA of different sizes all starting from the same point and ending at different points.

2. Separation of these different pieces of DNA on agarose gel.

3. Reading of sequence from gel.

10. Gene Pharming: -

1. Gene pharming is the use of transgenic farm animals to produce pharmaceuticals.

2. Gene pharming is being pursued by a number of firms.

3. Genes that code for therapeutic, and diagnostic proteins are incorporated into the animal's DNA and the proteins appear in the animal's milk.

11. Palindromic Sequence: -

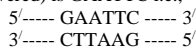
1. Palindromic sequences are sequences of four or six nucleotides on the DNA duplex that are recognized by specific restriction enzymes.

2. These sequences have a two fold-axis of symmetry, they "read" the same way in either direction on opposite strands.

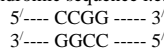
3. They always read in 5' → 3' direction.

4. The six nucleotide palindromic sequence recognized by Eco-R1 (one of the first restriction nucleases to be

discovered) is GAATTC i.e.,



4. Msp1, another restriction enzyme, cuts the DNA at CCGG palindromic sequence i.e.



12. Two Advantages of Polymerase Chain Reaction: -

1. Polymerase chain reaction enables synthesis of specific DNA segments from a complex mixture of DNA molecules in a test tube.

2. It has particular use in forensic science for identification based on traces of DNA in bloodstains, semen or even a single hair left at the scene of a crime.

13. "Gel Electrophoresis" Process: -

During gel electrophoresis process, the DNA fragments can be separated according to their lengths (molecular weight or size) and the result is a number of bands that are so close together that appear as a smear.

14. Recombinant DNA Technology: -

1. Recombinant DNA technology is the manipulation of genetic material of organisms for industrial, medical and research purposes.

2. It is popularly known as genetic engineering.

3. It aims at synthesizing recombinant DNA, which contains DNA from different sources. It usually utilizes bacterial cells and their plasmids which are small circular DNA molecule for making recombinant DNA. They can replicate freely within bacterial cells.

DNA recombinant technology can produce cells that contain a foreign gene. These cells are capable of producing a new and different protein. As a result of growth of these cells, so many identical copies of plasmid with a foreign gene are produced.

15. Two Goals of Human Genome Project: -

1. To locate the position of all the genes on each chromosome; this involves mapping.

2. To work out the entire sequence of bases for the whole genome; this is called sequencing.

16. Importance of Gene Sequencing: -

Gene sequence yields information about the structure of a gene and probable amino-acid sequence of its encoded proteins. Genetists compare gene sequences with other sequences stored in masses databases. Knowing the base sequence of normal genes may make

it possible to one day to treat certain human ills by administering normal genes or their protein products to those who suffer from a genetic disease.

17. Two Methods of Gene Therapies in Human: -

Two methods of gene therapies in human are:

1. Ex-vivo gene therapy in which cells are modified outside the body and then transplanted back again. It is usually used for the treatment of SCID.

- b. In-vivo gene therapy in which genes are inserted into the cells inside the body. This method is usually used for the treatment of cystic fibrosis.

18. Palindromic Sequence: -

See Lahore Board Answer No: 15

19. Two Uses of PCR Amplification Analysis: -

1. It forms the basis of many diagnostic procedures.
2. It has been used to amplify DNA sequences from traces of extinct organisms, and in human remains from prehistoric and Classical times.

20. Palindromic Sequence: -

See Lahore Board Answer No: 15

21. A) Taq Polymerase: -

Taq polymerase is a temperature insensitive (thermostable) DNA polymerase enzyme which has been extracted from the bacterium *Thermus aquaticus* living in hot springs.

B) Significance of Taq Polymerase: -

It catalyzes the replication of DNA strands. It can withstand high temperature, which is used to separate double stranded DNA, therefore, replication need not be interrupted by the need to add more enzyme.

22. Way by Which Bacterial Cell Becomes Permeable to Plasmid: -

Bacterial cell becomes permeable to plasmid when it is treated with sodium chloride.

23. Searching of Genomic Library: -

A certain gene present in a genomic library can be searched by using a particular probe. Following steps take place in searching the gene in a genomic library:

- a. Colonies of plasmid containing bacteria from the genomic library are grown on agar.
- b. Pressing a filter against the master plate causes some cells from each colony to adhere to the filter.
- c. The filter is then washed with a solution that denatures the DNA and contains the radioactive labeled probe.
- d. Only those colonies that contain the gene of interest will retain the probe and emit radioactivity on film placed over the filter.
- e. The film is then compared to the master plate to identify the gene-containing colony.

24. Two Different Methods in Gene Sequencing for Generation of DNA Fragments: -

- i. Two different methods in gene sequencing for generation of DNA fragments are:
 - i. One method is Sanger's method in which dideoxynucleoside triphosphates are used to terminate at different sites.
 - ii. The second method is known as Maxam-Gilbert in which DNA threads are chemically cut into pieces of different sizes.

25. Cystic Fibrosis: -

1. Cystic fibrosis affects the breathing, alimentary canal, and reproductive tubes and is characterized by the

secretion of unusually sticky mucus, which obstruct the passages. This leads to a range of effects, leading difficulty in breathing, greater susceptibility to disease, and gastrointestinal problems.

2. Cystic fibrosis patients lack a gene that codes for a trans-membrane carrier of the chloride ion.

26. Use of Taq Polymerase: -

Taq polymerase is used because when DNA sample is heated to 95 °C to separate DNA strands in PCR (an absolute requirement for PCR), all other polymerase also denature due to high temperature but *Taq polymerase* does not denature as it withstand high temperature.

27. Totipotents: -

See Gujranwala Board Answer No: 8

28. Probe: -

See Lahore Board Answer No: 17 (A)

29. Two Uses of PCR: -

1. To diagnose viral infections, genetic-disorders, and cancer
2. To determine the evolutionary history of human population

BAHAWALPUR BOARD QUESTIONS

1. What is gene sequencing? (Bahawalpur Board-2008-A)
2. What is gene therapy? (Bahawalpur Board-2008-A)
3. What are transgenic bacteria? (Bahawalpur Board-2008-A)
4. What is gene sequencing? (Bahawalpur Board-2008-A)
5. What is meant by Gene Therapy? (Bahawalpur Board-2009-A)
6. Define the term Totipotent. (Bahawalpur Board-2009-A)
7. What is meant by Severe Combined Immunodeficiency Syndrome (SCID)? (Bahawalpur Board-2009-A)
8. What is Gene Sequencing? (Bahawalpur Board-2009-A)
9. What is Tissue Culture? (Bahawalpur Board-2009-A)
10. What is Taq Polymerase? Give its one character and use. (Bahawalpur Board-2010-A)
11. How do you get a gene? Explain two possible ways only. (Bahawalpur Board-2010-A)
12. How does a Genetic Engineer produce a Salt Tolerant (Arabidopsis) Plant? (Bahawalpur Board-2010-A)
13. Write down the treatment of Cancer through Gene therapy. (Bahawalpur Board-2011-A)

14. What are Restriction Enzymes? Give their significance. (Bahawalpur Board-2011-A)
15. Define P.C.R. (Bahawalpur Board-2012-A)
16. What is Cloning of a Gene? (Bahawalpur Board-2013-A)
17. Give two possible way to get the gene of interest. (Bahawalpur Board-2013-A)
18. State tissue culture with one example. (Bahawalpur Board-2013-A)
19. What are Biofilters? (Bahawalpur Board-New Scheme-2014-A)
20. Define Palindromic Sequences and Sticky Ends. (Bahawalpur Board-New Scheme-2014-A)
21. What are Restriction Endonucleases? (Bahawalpur Board-New Scheme-2015-A)
22. Differentiate between Genetherapy and Angeoplasty. (Bahawalpur Board-New Scheme-2015-A)

Answers

1. Gene Sequencing: -

1. Sequencing aims to reveal the sequence of nucleotide in the DNA fragment.
2. In the late 1970s, methods were developed that allowed to nucleotide sequence of any purified DNA fragment to be determined simply and quickly.
3. The main principle of methods for gene sequencing is:
 - a. To generate pieces of DNA of different sizes all starting from the same point and ending at different points.
 - b. Separation of these different pieces of DNA on agarose gel.
 - c. Reading of sequence from the gel

2. Gene Therapy: -

1. Repairing a gene by inserting the normal gene into cells of the tissue in which mutant gene is expressed is called gene therapy. Or It is correction of a detrimental mutation by the addition of new DNA and insertion in a genome.
2. Gene therapy is directed principally towards hereditary disease such as cystic fibrosis, SCID or towards cancer.
3. The healthy gene is delivered either by viruses or liposomes or by direct injection. ◀
4. In gene therapy, genes are either inserted into the cells out side the body with the help of retrovirus and then

transplanted back again (Ex-vivo) or genes are inserted into the cells inside the body (In-vivo).

5. Whatever delivery method is used, unless the recombinant DNA is incorporated into cell's nuclear DNA, its effects are not permanent and the therapy is to be repeated.

3. Transgenic Bacteria: -

1. Bacteria in which foreign genes have been incorporated is referred to as transgenic bacteria.
2. Transgenic bacteria can be used to produce biotechnology products such as insulin, human growth hormone etc, to be used to promote health of plants to make them resistant towards insects, as bioremediation (pollution cleaner), to detect metals, to enhance genetic research to produce pharmaceutical products.

4. Gene Sequencing: -

1. Gene sequencing is the procedure by which sequence of nucleotides in DNA is determined. Or Gene sequencing is a method of determining nucleotide sequence of a gene (DNA molecules).
2. It is also known as DNA sequencing.
3. There are two DNA sequencing methods (Sanger's method and Maxam-Gilbert method) both are based on:
 - a. The generation of DNA fragments of different lengths which start at a fixed point and terminate at specific nucleotides.
 - b. The DNA fragments are separated by size on agarose gels.
 - c. The nucleotide sequence is read directly from the gel.
4. The techniques for sequencing DNA have become progressively more sophisticated so that much of the analysis can be automated. It is even possible to analyse DNA by putting it on specially prepared computer chips.

5. Gene Therapy: -

See Bahawalpur Board Answer No: 2

6. Totipotent: -

1. Totipotent is a term describing a cell or nucleus that contains the complete set of genetic instructions required to direct the normal development of an entire organism.
2. German botanist Gottlieb Haberlandt said in 1902 that plant cells are totipotent that a single cell could become a complete plant. But it wasn't until 1958 that Cornell botanist F.C.Steward grew a complete carrot plant from a tiny piece of phloem.
3. Each of the cells of morulla vertebrate animals are totipotent, meaning they are potentially capable of expressing all of the genes in their genome. If they are separated from one another, any one of them can produce a completely normal individual.

7. Severe Combined Immunodeficiency Syndrome (SCID): -

1. Severe Combined Immunodeficiency Syndrome (SCID) is an extremely rare inherited condition in which an enzyme adenosine deaminase (ADA) is missing that is involved in the maturation of T and B cells, and hence immune system is non-functional.
2. The first complete cure of SCID was achieved by

Ex-vivo gene therapy in 2000 in Paris. Bone marrow cells were extracted and infected with a retrovirus in which the normal gene had been inserted. Stem cells were returned to the patient. Children who have undergone this procedure do have a significant improvement in their immune function that is associated with rise in the level of ADA enzyme activity in the blood.

8. Gene Sequencing: -

See Bahawalpur Board Answer No: 1

9. Tissue Culture: -

1. Tissue culture is the growth of a tissue in an artificial liquid culture medium.
2. German botanist Gottlieb Haberlandt said that plant cells are totipotent-- each cell of the plant has the full genetic potential of the organism -- and therefore, a single cell of a plant could become a complete plant.
3. But it wasn't until 1958 that Cornell botanist F.C. Steward grew a complete carrot plant from a tiny piece

of phloem. He provided the cells with sugar, minerals and vitamins, but also coconut (containing cytokinin).

When the cultured cells began dividing, they produced

a callus, an undifferentiated group of cells. Then the callus differentiated into shoot, and root and developed into a complete plant.

4. Since then many methods of tissue culture are being applied.

10. A) Taq Polymerase: -

It is a DNA polymerase enzyme extracted from the heat-loving bacterium *Thermus aquaticus*, an inhabitant of hot springs.

B) One Character of Taq Polymerase: -

It can withstand high temperature and has an optimum temperature of 80 °C.

C) Use of Taq Polymerase: -

It is used in polymerase chain reactions to synthesize DNA strands at 70°--75°C.

11. Two Possible Ways of Getting Gene: -

1. Genes can be isolated from the chromosomes by cutting the chromosomes on the flanking sites of gene using special enzymes known as restriction endonucleases.
2. Another very common method of getting the gene is to synthesize it in the laboratory from messenger RNA, using reverse transcriptase.

12. Production of Salt Tolerant (Arabidopsis) Plant: -

For the production of salt tolerant plant

(*Arabidopsis*),

first genetic engineer identifies a gene coding for a channel protein that transports Na⁺ along with H⁺ across a vacuole membrane. Isolating Na⁺ in a vacuole

prevents it from interfering with plant metabolism.

Then, the genetical engineer clones the gene and use

it

to genetically engineer plants that overproduce the channel proteins. The modified plants thrive when they

are watered with a salty solution.

13. Treatment of Cancer Through Gene Therapy: -

Gene therapy is being done to cancer patients, which makes them more tolerant of chemotherapy. In clinical

trials researches have given genes to cancer patient that

make either healthy cells more tolerant of chemotherapy or make tumors more vulnerable to it. Once the bone marrow cells protected it was possible to increase the level of chemotherapy to kill the cancer cells.

14. A) Restriction Enzymes: -

Restriction endonucleases hydrolyze phosphodiester bonds of polynucleotide chains at specific sequences. The sites recognized by many restriction endonucleases are palindromes.

B) Significance of Restriction Enzyme: -

By using a selected restriction enzyme, DNA molecules extracted from different organisms can be cut at predictable sites and made to produce lengths of

DNA which contain specific genes. Or Restriction enzymes enables scientists to cut DNA from chromosomes in shorter fragments in a controlled way.

15. P.C.R: -

1. P.C.R (Polymerase Chain Reaction) takes its name from DNA polymerase, the enzyme that carries out DNA replication in a cell. It is considered a chain reaction because DNA polymerase will carry out replication over and over again, until there are million

of copies of the desired DNA.

2. The essential materials required for PCR are:

- a. The starting DNA, two strands of which act as template.
- b. The raw materials in the form of nucleoside triphosphates
- c. The heat insensitive enzyme, *Taq polymerase*
- d. Primers with sequences of about 20 bases that are complementary to the bases on either side of the target DNA.

16. Cloning of a Gene: -

1. Cloning of a gene produces many identical copies of a gene.

2. Recombinant DNA technology is used when a very large quantity of a gene is required.
3. Following steps take place in gene cloning:
 - a. First, gene of interest is obtained either by isolating it from DNA by restriction endonucleases, by synthesizing chemically or by making it from mRNA.
 - b. Gene of interest is then placed into either plasmid of bacterium or DNA of a phage (vector) to prepare recombinant DNA or rDNA.
 - c. The gene of interest along with the vector (i.e. rDNA) is then introduced into an expression system usually a bacterium host, as a result of which a specific product is made.
 - d. A gene of interest can be isolated from rDNA by hybridizing a particular probe. Now this particular fragment (gene of interest) can be cloned further or even analysed for its particular DNA sequence.

17. Two Possible Ways to Get the Gene of Interest: -

1. To isolate gene of interest from the chromosome using restriction endonucleases (enzymes).
 2. To synthesize small gene chemically in the laboratory.
- 18. Tissue Culture With One Example: -**
1. Process of growing tissue artificially in liquid medium in laboratory glasswares is called tissue culture. Or Tissue culture is the growth of tissue or cells in a synthetic growth medium under sterile conditions.
 2. In one case, the cell wall is removed with enzymes, leaving behind the protoplast, a plant cell enclosed only by a plasma membrane. When protoplasts are transferred to a culture medium, cell wall regeneration takes place. This is followed by cell division to form clumps of cells that can be manipulated to produce somatic embryos which are then encapsulated in a protective hydrated gel (and sometimes called artificial seeds) that can be shipped everywhere. It is possible to produce millions of somatic embryos in bioreactors for certain vegetables like tomato, celery, asparagus, and for ornamental plants like lilies, begonias, and African violets. A mature plant develops from each somatic embryo.

19. Biofilters: -

1. Biofilters are the organisms which absorb air born pollutants from the atmosphere.
2. Some bacteria can be used as biofilters to prevent airborne chemical pollutants from being vented into the air.

20. A) Palindromic Sequences: -

1. Palindromic means reading the same forward and backward.
2. DNA sequences are palindromic, when the base

sequence of one strand reads the same as its complement when both are read in the 5' to 3' direction.

3. Restriction enzyme cleaves a DNA duplex molecule at a particular base sequence, usually within or near a palindromic sequence.
3. Eco-RI recognizes the palindromic sequence of

$$\begin{array}{c}
 5' \text{ GAATTC } 3' \\
 5' \text{ -----GAATTC----- } 3' \\
 3' \text{ -----CTTAAG----- } 5'
 \end{array}$$

B) Sticky Ends: -

1. The single stranded but complementary ends of the two DNA molecules are called "sticky ends".
2. They can bind by complementary base pairing.
3. They facilitate the insertion of foreign DNA into vector DNA. Or
 1. Some restriction enzyme cut both strands of DNA in a staggered fashion, resulting in single-stranded segments (fragments) at the ends of cleaved DNA that can base pair with each other and are called sticky ends.
 2. These sticky ends can anneal with any DNA fragment cut by the same enzyme, thus facilitating the insertion of foreign DNA into vector DNA.

21. Restriction Endonucleases: -

See Lahore Board Answer No: 3

22. Differences between Genetherapy and Angioplasty:

Genetherapy	Angioplasty
1. It is insertion of genetic material into human cells for the treatment of a disorder.	1. It is opening up of a closed artery of heart.
2. It occurs in vivo as well as in vitro.	2. It occurs in vivo.

FAISALABAD BOARD QUESTIONS

1. Explain micropropagation. (Faisalabad Board-2009-A)
2. What is Genomic library? (Faisalabad Board-2009-A)
3. Give two primary goals of human genome project. (Faisalabad Board-2010-A)
4. What is cystic fibrosis? (Faisalabad Board-2010-A)
5. What is SCID and ADA? (Faisalabad Board-2010-A)
6. What are bioreactors? (Faisalabad Board-2011-A)
7. Define PCR. (Faisalabad Board-2011-A)
8. Define DNA figure printing. (Faisalabad Board-2012-A)
9. What do you know about particle gun?

- (Faisalabad Board-2013-
A)
10. How gene therapy has been used for the treatment of coronary artery angioplasty?
(Faisalabad Board-2013-
A)
11. Why plants cells are said to be totipotent?
(Faisalabad Board-2013-
A)
12. What is recombinant DNA?
(Faisalabad Board-New Scheme-2015-
A)
13. Why transgenic animals that secrete a product are often cloned? (Faisalabad Board-New Scheme-2015-
A)

Answers

1. Micropropagation: -

- Micropropagation is a commercial method of producing thousands, even millions of identical seedlings in a limited amount of space.
- One favourite method to accomplish micropropagation is by meristem culture. If the correct proportions of auxins and cytokinins are added to a liquid medium, many new shoots develop from a single shoot tip. When these are removed more shoots form. Since the shoots are genetically identical the plants that develop from them are called clonal plants, all having the same trait. Another advantage of meristem culture is that meristem, unlike other portions of a plant, is virus free, therefore the plants are also virus free.
- Genomic Library: -**
See Lahore Board Answer No: 15 (B)
- Two Primary Goals of Human Genome Project: -**
The human genome project aims:
 - To map the position of genes on the chromosomes.
 - To discover the sequence of bases in the DNA.
- Cystic Fibrosis: -**
See Gujranwala Board Answer No: 17
- A) SCID: -**
Severe Immunodeficiency Syndrome is an extremely rare inherited disease in which there is no functional immune system because T and B cells do not mature. Death occurs in infancy unless the child is completely isolated from potential pathogens in a large bubble. It is caused by recessive allele that can be either autosomal or X-linked.

B) ADA: -

- ADA is an enzyme called adenosine deaminase.
- It is involved in the maturation of T and B cells.
- Children with SCID lack ADA hence their immune system is non-functional and they are subjected to life threatening infections.
- Bioreactors: -**
See Gujranwala Board Answer No: 18
- PCR: -**

- PCR is the method of synthesis of short targeted DNA fragments in vitro very rapidly.
- It allows the synthesis of a selected part of the genome between two regions whose sequences are known. The known sequences are used to design two synthetic primers of about 20 bases.
- The steps are as follows:
 - DNA is heated to 95 °C to 30 seconds to denature the DNA, each strand being used as a template to build the other strand.
 - Taq polymerase*, four nucleoside triphosphates and primers are added.
 - The mixture is cooled to 50°-70°C to allow the primers at either end of the DNA to be amplified.
 - The DNA is replicated at a temperature of 70°-75°C producing two double-stranded molecules.
 - The DNA is heated again to denature and process repeated for 20-30 cycles. The second cycle produces four DNA molecules, the third produces eight, and so on.
- DNA Figure Printing: -**
 - The entire genome of an individual can be subjected to DNA fingerprinting.
 - The genome is treated with restriction enzymes, which results in a unique collection of different sized fragments.
 - Therefore, restriction fragment length polymorphism (RFLPs) exists between individuals.
 - During gel electrophoresis, the fragments can be separated according to their lengths and the result is a number of bands that are close together that they appear as a smear. However, the use of for genetic markers produces a distinctive pattern that can be recorded on X-ray film. Or
 - DNA fingerprinting is the analysis of DNA extracted from an individual, which is unique to that individual.
 - It is also known as DNA typing, DNA profiling or restriction length polymorphism (RFLPs).
 - It has been observed that about 30 per cent of human DNA does not code for proteins and repeated frequently in the genome of that individual. Although these repetitive units vary in length from person to person, each of such repetitive sequence are 10 to 100 bases long.
 - After treatment with the appropriate restriction enzyme, the fragments are separated using gel electrophoresis.
 - The banding patterns of these fragments in electrophoresis are unique to an individual and different from all other individuals.

6. The differences in DNA electrophoresis patterns among individuals are called restriction fragment length polymorphism (RFLPs).
7. Since RFLPs of each human being are unique analogous to the fingerprints, which are used as marks of identity, so RFLPs can be termed as fingerprinting.

9. Particle Gun: -

1. Particle gun is a device constructed by John C. Sanford and Theodor M. Klein of Cornell University in 1987 to introduce DNA into a plant tissue culture callus.
2. This particle gun bombards a callus with DNA coated microscopic metal particles. Then genetically altered somatic embryos develop into genetically adult plants.
3. Many plants including corn and wheat varieties have been genetically engineered by using particle gun.

10. Gene Therapy For Treatment of Coronary Artery

Angioplasty: -

During coronary artery angioplasty, a balloon catheter is used to open up a closed artery. Unfortunately, the artery has a tendency to close up once again. But investigators have come up with a new procedure.

The balloon is coated with a plasmid that contains a gene for vascular and endothelial growth factor. The expression of the gene, which promotes the proliferation of blood vessels to bypass the obstructed area, has been observed in at least one patient.

11. Plants Cells Said to be Totipotent: -

Plants cells are said to be totipotent because each cell has the full genetic potential of the organism and a single cell could become a complete plant.

12. Recombinant DNA: -

1. It is a DNA with fragments of DNA from two different species such as bacterium and mammal spliced together in a single molecule. Or Any DNA molecule that is made by combining genes from different organisms is called Recombinant DNA.

Or

- It is DNA that contains genes from more than one source.
2. It is abbreviated as rDNA.
3. It is also known as chimaeric DNA.
4. For preparation of a recombinant DNA, plasmid is cut with the restriction enzyme. The gene of interest is also cut with the same enzyme. The gene of interest is then joined with the plasmid with the help of another enzyme known as DNA ligase to form a recombinant

DNA.

13. Transgenic Animals Secreting a Product are Often Cloned: -

See Exercise Chapter No: 23 Answer No: 1 (B)

RAWALPINDI BOARD QUESTIONS

- Describe the process of cloning. (Rawalpindi Board-2011-
A)
- What are bioreactors? (Rawalpindi Board-2011-
A)
- What are restriction endonucleases? (Rawalpindi Board-2012-
A)
- What is probe? How is it traced? (Rawalpindi Board-2013-
A)
- Define molecular scissors. How are they obtained? (Rawalpindi Board-2013-
A)
- How can you trace a murder, who assaulted a woman on a deserted place? (Rawalpindi Board-2013-
A)
- Name salt tolerant plant and its role in future. (Rawalpindi Board-New Pattern-2014-
A)
- Why urine is preferable vehicle for bio-technology product? (Rawalpindi Board-New Pattern-2014-
A)
- What are Plasmids? Give their role. (Rawalpindi Board-New Pattern-2015-
A)
- What are restriction endonucleases? (Rawalpindi Board-New Pattern-2015-
A)

Answers

1. Process of Cloning: -

a. Procedure to clone a gene: -

Process of cloning can be explained as follows:

- First, gene of interest is obtained either by isolating it from DNA by restriction endonucleases, by synthesizing chemically or by making it from mRNA.
- Gene of interest is then placed into either plasmid of bacterium or DNA of a phage (vector) to prepare recombinant DNA or rDNA.
- The gene of interest along with the vector (i.e. rDNA) is then introduced into an expression system usually a bacterium host, as a result of which a specific product is made.
- A gene of interest can be isolated from rDNA by hybridizing a particular probe. Now this particular fragment (gene of interest) can be cloned further or even analysed for its particular DNA sequence.

b. Procedure to clone a transgenic animal: -

- 2n nuclei of transgenic animal (goat) are transferred into enucleated donor eggs by microinjection.
- These eggs are then transferred into the uterus of host goats where development occurs.

Commented [D1]:

Commented [S2R1]:

Commented [S3R1]:

c. Host goats give birth to cloned transgenic goats which produce biotechnology product in their milk.

2. Bioreactors: -

See Gujranwala Board Answer No: 18

3. Restriction Endonucleases: -

1. Restriction endonucleases are enzymes that act like chemical scissors cutting the polynucleotide backbone of the DNA whenever they encounter aspecific sequences of bases called a restriction site.

2. They are produced by bacteria as a defence against bacteriophages.

3. First restriction endonuclease was isolated by Smith in 1970. Since then 400 such enzymes have been isolated

out of which about 20 are frequently used in recombinant DNA technology.

4. Each restriction enzyme is named according to the bacterium from which it was extracted. Thus Eco-R1 was extracted from *Escherichia coli*, strain R, the 1 indicating that it was the first enzyme to be extracted from this bacterium.

5. An interesting feature of restriction enzyme is that in almost all cases the recognition sequence is palindromic, meaning that it reads the same way as forwards as backward but always is read from 5' to 3' direction. Thus Eco-R1 recognizes 5' CAATTG 3'.

6. Restriction enzymes fall into two groups, according to

the kind of ends they generate at the cutting site.

a. Some produce staggered cuts and sticky ends.

b. Others cut the two strands opposite each other generating blunt or flush ends.

4. A) Probe: -

Probe is usually a radioactively labeled or inflorescent segment of single stranded DNA that can hybridize—become attached by base pairing—to complementary base sequence in the target gene. Or A probe is a short length of single-stranded DNA used

to locate a specific DNA sequence. Or A probe is a short, single –stranded, polynucleotide with a base sequence complementary to part of the gene being sought.

B) How Probe Is Traced: -

As probe is usually radioactive, hence it is traced by autoradiography using x-ray film.

5. A) Molecular Scissors: -

Molecular scissors are the restriction endonucleases (enzymes) which cut the polynucleotide backbone of the DNA wherever they encounter a specific sequence of bases called a restriction site.

B) How Molecular Scissors are Obtained:

Molecular scissors are obtained from bacteria. They are natural enzymes of bacteria, which they use for their own protection against viruses.

6. Tracing of Murderer: -

1. Hair and skin cells recovered from underneath

assaulted woman's nails are suspected the hair and skin of murderer.

2. DNA can be extracted from skin or hair cells.

3. Extracted DNA ia then cut into fragments by restriction enzymes.

4. Using electrophoresis, the DNA fragments are separated on the basis of their size.

5. Radiograph (X-ray) can make these fragments visible.

6. In the same way the finger prints of woman and three suspects can be obtained and analyzed.

7. Comparison of DNA finger prints of the skin and hair

recovered with the woman and three suspects will trace the murderer.

7. A) Name of Salt Tolerant Plant: -

Arabidopsis

B) Role of Salt Tolerant Plant in Future: -

Production of not only salt-but also drouht and cold tolerant plants in future will reduce the need for added

farm acreage by increasing agriculture yields that will

provide enough food for a world production that is expected to nearly double by 2050.

8. Urine as a Preferable Vehicle for Bio-technology Product: -

Urine is a preferable vehicle for bio-technology product than milk because:

1. All animals in a hard urinate while only females produce milk.

2. Animals start to urinate at birth while females donot produce milk until maturity.

3. It is easier to extract from urine than from milk.

9. A) Plasmids: -

Plasmid is extra-chromosomal DNA, usually circular,

that replicatesindependently of the main

chromosome,

although it may have bee derived from it.

B) Role of Plasmids: -

1. It is a DNA molecule in which gene of interest is inserted to construct a recombinant DNA (rDNA).

2. It is capable of replication in host organism, hence it acts as a vehicle to transport recombinant DNA (rDNA) into host cell and is called vector in biotechnology.

10. Restriction Endonucleases: -

See Rawalpindi Board Answer No: 3

SARGODHA BOARD QUESTIONS

1. Define restriction enzymes. (Sargodha Board-2010-A)

2. Explain two primary goals of human genome project. (Sargodha Board-2010-A)

3. How the term totipotent given by Haberlandt is modified by Steward? (Sargodha Board-2010-A)

4. What is probe? (Sargodha Board-2011-A)

5. Name fire fly enzyme and its role.

- (Sargodha Board-2011-
A)
6. What is Gene-pharming? (Sargodha Board-2012-
A)
7. Give cause and treatment of cystic fibrosis patients.
(Sargodha Board-2013-
A)
8. Give the process of coronary artery angioplasty.
(Sargodha Board-2013-
A)
9. Give the use of cell suspension culture technique.
(Sargodha Board-2013-
A)

Answers

1. Restriction Enzymes: -

Restriction enzymes are nuclease enzymes that recognize the short sequence of nucleotides in a DNA molecule and cut the DNA at this recognition sequence. Or

- These are the enzymes that cleave DNA at specific base sequences.
- They are produced by bacteria to degrade foreign DNA.
- They are used in recombinant DNA technology.

Or

These are the enzymes which are capable of recognizing and cutting a specific symmetrical nucleotide sequence in DNA.

2. Two Primary Goals of Human Genome Project: -

See Exercise Chapter No: 23 Answer No: 2 (A)

3. Modification of Term Totipotent: -

4. Probe: -

- Probe is usually a labeled single-stranded DNA used to hybridize to other DNA samples to detect the complementary sequences present.
- Probe is labelled with radioactivity or with a chemical marker or enzyme.
- Biologists use probes to trace the gene of interest.

They

transfer cells from bacterial colony on nitrocellulose membrane, which becomes a replica of the colonies. They treat the cells on the membrane chemically to lyse them making the DNA single stranded. Then

they

incubate the membrane with the radioactive probe mixture to let the probes hybridize with any complementary strands of DNA and are detected by radioautography.

5. Name of Fire Fly Enzyme: -

Name of fire fly enzyme is luciferase.

B) Role of Fire Fly Enzyme: -

Luciferase enzyme glows when a substrate luciferin is present.

6. Gene-Pharming: -

- Producing transgenic live stock, such as pigs, sheep, cows and goats, that secrete foreign proteins in their milk is known as gene "pharming," a combination of pharmaceuticals and farming.

- In gene pharming, recombinant genes are fused to the regulatory sequences of milk protein genes, and such genes are therefore activated only in mammary tissues involved in milk production. The protein is then purified from the milk.

7. A) Cause of Cystic Fibrosis: -

Cystic fibrosis patients lack a gene that codes for trans-membrane carrier of the chloride ion. Or It is caused by an autosomal recessive allele located on chromosome 7. It is a mutant form of gene that codes for a protein (CFTR = cystic fibrosis trans-membrane conductance regulator), that serves as chloride ion channel in the plasma membrane. This ion channel transports chloride ions out of the cells lining the digestive and the respiratory tracts. When chloride ions leave the cells, water follows by osmosis due to which normal secretions of these cells are relatively watery. Absence of chloride ion channels in the cells of cystic fibrosis patients leads to production of sticky mucus with very low water contents in the airways and in the digestive tract.

B) Treatment of Cystic Fibrosis Patients: -

In-vivo method of treatment is being tried in which normal gene in liposomes (liposome microscopic vesicles) is sprayed into patient lungs. The introduced gene is incorporated into the lung epithelial cells but is effective for only a short period and the treatment has to be repeated regularly.

8. Process of Coronary Artery Angioplasty: -

- During coronary artery angioplasty, a balloon catheter is sometimes used to open up a closed artery.
- Unfortunately artery has a tendency to close up again, hence new method is being applied in which genes are being used to treat coronary artery angioplasty. It has been known for some time that VEGF (vascular endothelial growth factor) can cause the growth of new blood vessels. The gene that codes for this growth factor can be injected alone or within a virus or plasmid through balloon catheter into the heart to stimulate branching of coronary blood vessels. Improvements have been recorded.

9. Use of Cell Suspension Culture Technique: -

1. Cell suspensor culture produces the same chemicals as plants, hence:
 - a. Cell suspension cultures of *Cinchona ladgeriana* produce quinine.
 - b. Cell suspension cultures of *Digitalis lanata* produce digitoxin.
2. Scientists envision that it will be possible to maintain cell suspension cultures in bioreactors for the purpose of producing chemicals used in the production of drugs, cosmetics and agricultural chemicals. If so, it will no longer be necessary to farm plants for the purpose of acquiring the chemicals they produce.

DERA GHAZI KHAN BOARD QUESTIONS

1. What is the importance of DNA fingerprinting? (D.G.K. Board-2009-
A)
2. How can you get gene of interest for DNA biotechnology? (D.G.K. Board-2009-
A)
3. How can you test a tobacco plant containing luciferase gene? (D.G.K. Board-2009-
A)
4. What is Chimaeric DNA? (D.G.K. Board-2010-
A)
5. Give two goals of human genome project. (D.G.K. Board-2010-
A)
6. What is the contribution of Gottlieb Haberlandt in tissue culture? (D.G.K. Board-2010-
A)
7. What are transgenic organisms? (D.G.K. Board-2011-
A)
8. Define Hybridization. What are its uses? (D.G.K. Board-Group-I-2012-
A)
9. What do you mean by Totipotent? (D.G.K. Board-Group-II-2012-
A)
10. Define gene therapy. (D.G.K. Board-Group-I-2013-
A)
11. What is the role of a vector? (D.G.K. Board-Group-I-2013-
A)
12. What is the main role of molecular carrier in Biotechnology? (D.G.K. Board-Group-I-2013-
A)
13. Give three possible ways to get the gene of interest. (D.G.K. Board-Group-II-2013-
A)
14. How transgenic animals are developed? (D.G.K. Board-Group-II-2013-
A)
15. What are Palindromic sequences? (D.G.K. Board-Group-II-2013-
A)
16. Define Restriction Enzymes. (D.G.K. Board-New Scheme-Group-I-2014-
A)

17. What is Genetic Engineering? (D.G.K Board-New Scheme-Group-I-2014-
A)
18. What is cell suspension culture? (D.G.K Board-New Scheme-Group-II-2014-
A)
19. Give difference between Ex-vivo and In-vivo Gene therapy. (D.G.K. Board-New Scheme-Group-II-2014-
A)
20. What are restriction enzymes? (D.G.K Board-New Scheme-Group-I-2015-
A)
21. Define genomic library. (D.G.K Board-New Scheme-Group-I-2015-
A)
22. How can you get a gene? (D.G.K Board-New Scheme-Group-II-2015-
A)
23. Give two goals of human genome project. (D.G.K Board-New Scheme-Group-II-2015-
A)

Answers**1. Importance of DNA Fingerprinting: -**

1. DNA fingerprinting is used to settle disputes over parentage, and relationships.
2. It is also used to identify criminals from blood, semen, saliva, hair follicles etc. left at the scene of a crime.
3. It has also a spectacular potential for medicine, for instance in the parental diagnosis of inherited disorders.

2. Getting Gene of Interest for DNA Biotechnology: -

See Lahore Board Answer No: 9

3. Testing of a Tobacco Plant Containing Luciferase Gene: -

When a plant containing luciferase gene is watered with a solution of luciferin—the substrate for fire fly luciferase—the luciferase gene glows and light is generated from all plant tissues.

4. Chimaeric DNA: -

1. It is also known as recombinant DNA or rDNA.
2. It is the DNA that has been produced by artificially combining DNA from different organisms.

5. Two Goals of Human Genome Project: -

See Exercise Chapter No: 23 Answer No: 2 (A)

6. Contribution of Gottlieb Haberlandt in Tissue Culture: -

Gottlieb Haberlandt introduced the term totipotent (the cell that has the full genomic potential of the organism)

for plant cell and gave the idea that a single cell of plant could become a complete plant.

7. Transgenic Organisms: -

See Lahore Board Answer No: 4

8. A) Hybridization: -

Hybridization is the crossing of different varieties of plants or even species.

B) Uses of Hybridization: -

1. It is used to produce plants with desirable traits.
2. Hybridization, followed by vegetative propagation of

the mature plants, generates a large number of identical

plants with these traits.

3. Today hybridization has been replaced by genetic engineering, because today it is possible to directly alter the genes of organisms by recombinant DNA technology (genetic engineering).

9. Totipotent: -

See Lahore Board Answer No: 19

10. Gene Therapy: -

See Gujranwala Board Answer No: 19

11. Role of a Vector: -

See Lahore Board Answer No: 10

12. Main Role of Molecular Carrier in Biotechnology: -

See Lahore Board Answer No: 10

13. Three Possible Ways to Get the Gene of Interest: -

See Lahore Board Answer No: 9

14. Developing of Transgenic Animals: -

1. Transgenic animals are usually developed by injecting the DNA of a particular gene into the nucleus of a fertilized egg cell. It is possible to micro inject foreign genes into eggs by hand by using vortex mixing method. In vortex mixing method eggs are placed in an agitator with DNA and silicon-carbide needles.

The needles make tiny holes in the eggs through which the

DNA can enter the eggs. When these eggs are fertilized, the resulting offspring are transgenic animals.

2. Another method of producing transgenic animals is the use of viruses as recombinant DNA vectors. RNA viruses called retroviruses make DNA copies of

themselves by reverse transcription. Sometimes DNA

copies become integrated into the host chromosomes,

where they are replicated along with host DNA.

15. Palindromic Sequences: -

See Lahore Board Answer No: 15

16. Restriction Enzymes: -

See Lahore Board Answer No: 3

17. Genetic Engineering: -

See Gujranwala Board Answer No: 12

18. Cell Suspension Culture: -

1. The culturing of plant tissues has led to a technique called cell suspension culture. Rapidly growing cultures are cut into small pieces and shaken in a liquid nutrient medium so that single cells or small clumps of

cells break off and form a suspension.

2. Cells in the cell suspension culture produce the same chemicals as the entire plant.

3. For example, cell suspension cultures of *Cinchona ledgeriana* produce quinine and those of *Digitaria lanata* produce digitoxin.

19. Differences between Ex-vivo and In-vivo Gene Therapy: -

See Lahore Board Answer No: 6

20. Restriction Enzymes: -

See Lahore Board Answer No: 3

21. Genomic Library: -

See Sahiwal Board Answer No: 5

22. Getting A Gene: -

See Lahore Board Answer No: 9

23. Two Goals of Human Genome Project: -

See Exercise Chapter No: 23 Answer No: 2 (A)

SAHIWAL BOARD QUESTIONS

1. What is the function of restriction endonucleases.
(Sahiwal Board-2013-A)
2. What is Gene-Pharming? (Sahiwal Board-2013-A)
3. Define cloning of transgenic animals, give an example.
(Sahiwal Board-2013-A)
4. What is gel electrophoresis?
(Sahiwal Board-Old Scheme-2014-A)
5. Describe genomic library.
(Sahiwal Board-New Scheme-2014-A)
6. What is cystic fibrosis?
(Sahiwal Board-New Scheme-2014-A)
7. What is genomic library?
(Sahiwal Board-New Scheme-2015-A)
8. What do you know about palindromic sequence?
(Sahiwal Board-New Scheme-2015-A)

Answers

1. Function of Restriction Endonucleases: -

It hydrolyses phosphodiester bonds of polynucleotide chains at specific sequences. The sites recognized by many restriction endonucleases are palindromes. It is naturally produced by bacteria to cut the viral DNA.

Or

Restriction enzyme cleaves a DNA duplex molecule at a particular base sequence, usually within or near a palindromic sequence.

2. Gene-Pharming: -

See Multan Board Answer No: 10

3. A) Cloning of Transgenic Animals: -

Following steps take place in cloning of transgenic animals:

- a. 2n nuclei of transgenic animal are transferred into enucleated donor eggs by microinjection.
- b. These eggs are then transferred into the uterus of hosts where development occurs.
- c. Host animals give birth to cloned transgenic animals which produce biotechnology products in their milk.

B) Example: -

A goat is genetically engineered to produce antithrombin III, which is secreted in her milk.

4. Gel Electrophoresis: -

1. Gel electrophoresis is the technique for separating DNA fragments of different lengths, using an electric

- field in a porous gel.
- 'Phoresis' means to carry, so 'electrophoresis' means to carry with electricity.
 - DNA has negatively charged phosphate groups, so in an electric field a polynucleotide moves towards the pole (anode). DNA fragments move through the sub-microscopic spaces of gel. Larger fragments encounter greater resistance and so move more slowly. As a result the DNA separates out into a series of bands, each band representing millions of fragments of identical length.
(Note: - Different kinds of gel have different pore sizes. *Agrose*, a purified form of agar, has large pores and is suitable for sorting longer fragments. *Polyacrylamide* has smaller pores and is suitable for shorter fragments and can be used to separate fragments differing in length by a single nucleotide).
 - Genomic Library: -**
 - It is collection of recombinant plasmids in which all the DNA in the genome is represented. Or Genomic library is a representation of the entire genome in a vector.
 - To make the genomic library, entire genome is extracted and treated with restriction enzyme to break it into a very large number of manageable fragments. The DNA fragments are then inserted in to vectors (plasmids or viruses) which are then inserted into bacteria to generate millions of recombinant molecules, each containing one piece of the genome. Each bacterium cell which grows to produce a colony (if the vector is plasmid) or plaque (if the vector is a phage) takes up only one recombinant molecule. Different cells take up vectors containing different donor inserts.
 - Collection of genomic clones is termed genomic library.
 - Cystic Fibrosis: -**
See Gujranwala Board Answer No: 17
 - Genomic Library: -**
See Sahiwal Board Answer No: 5
 - Palindromic Sequence: -**
See Lahore Board Answer No: 15

C h a p t e r ----

24

EVOLUTION

3 SQs

I) From Exercise:-

Questions

- What are Hydrothermal Vents?
 - State Endosymbion Hypothesis.
 - Define population genetics.
 - How does fossil record provide evidence of evolution?
 - Explain the term homology with a suitable example.
 - What are vestigial organs? Give two examples.
 - How are evolutionary relationships reflected in DNA and proteins?
 - State Hardy Weinberg theorem.
 - What is the difference between the endangered species and threatened species?
 - Name any five species, declared extinct in Pakistan.
- Answers**
- Hydrothermal Vents: -**
 - Hydrothermal Vents are under water hot springs deep in the oceans.
 - A hypothesis called vent hypothesis speculates that life originated in these hydrothermal vents. These vents could have supplied the energy and raw materials for the origin and survival of early life forms.
 - Archeobacteria, a group of ancient bacteria that tolerate the temperatures upto 120 °C and have undergone the evolutionary change than any other living species, support this vent hypothesis.
 - Endosymbiont Hypothesis: -**
 - The eukaryotic cell might have evolved when a large anaerobic (living without oxygen) amoeboid prokaryote ingested small aerobic (living with oxygen) bacteria and stabilized them instead of digesting them.
This idea is known as the endosymbiont hypothesis.
 - Endosymbiont hypothesis was first proposed by Lynn Margulis.
 - According to this hypothesis:
 - Aerobic bacteria developed into mitochondria, which are the site of aerobic respiration and most energy conversion in eukaryotic cells.
 - Flagell may have arisen through the ingestion of prokaryotes similar to spiral shaped bacteria called spirochetes.
 - Ingestion of prokaryotes that resembled present-day cyanobacteria could have led to the endosymbiont development of chloroplasts in plants.
 - Population Genetics: -**
 - Population genetics is the study of genetic events in a gene pool. Or
It is the study of genetic variability in a population and of the forces that act on it.
 - It emphasizes the extensive genetic variation within populations and recognizes the importance of quantitative characters.
 - Fossil Record Providing Evidence of Evolution: -**
 - Fossils are either the actual remains or traces of organisms that lived in the ancient geological times.
 - Succession of fossil forms is a strong evidence in favour of evolution. It provides a visual record in a complete series showing the evolution of an organism.
 - For instance, evidence from biochemistry, molecular biology, and cell biology places prokaryotes as the ancestors of life, and predicts that bacteria should

precede all eukaryotic life in the fossil record. Indeed the oldest known fossils are prokaryotes. Or

1. Fossil record demonstrates that life has evolved through time.
2. Fossil record is rich in information. One of its most striking patterns is a succession of life forms from simple to the more complex.
3. Fossil record allows scientists to deduce the chronological appearance of the different classes of vertebrate animals from fishes to amphibians to reptiles to mammals and birds. This sequence is consistent with the history of vertebrate descent.
4. Sometimes fossil record is complete enough to allow us to trace the history of an organism. For example, the extensive fossil record for horses provides a detailed view of diversification of this group, from small forest dwellers to large and fast modern grassland species.

5. A) Homology: -

1. Similarity in characteristics resulting from common ancestry is known as homology.
2. The organs that exhibit such similarity are called homologous organs.
3. It describes structures that have common evolutionary origin.

B) Example: -

The wing of a bat and the arms of human are homologues.

6. A) Vestigial Organs: -

1. Vestigial organs are historical remnants of structures that had important functions in ancestors but are no longer essential presently.
2. Vestigial organs are older homologous structures.
3. They are rudimentary structures of marginal, if any, use to the organisms.

B) Two Examples: -

1. The skeletons of whales and some snakes retain vestiges of pelvis and leg bones of walking ancestors.
2. Vermiform appendix in carnivores

7. Evolutionary Relationships Reflected in DNA and Proteins: -

Evolutionary relationships among species are reflected

- a. In their DNA (genes) and proteins (gene products).
- a. If two species have genes and proteins with sequences

of monomers that match closely, the sequence must have been copied from a common ancestor. For example, a common genetic code brings evidence

that all life is related.

- b. Similarly, taxonomically remote organisms, such as humans and bacteria, have some common proteins in common. For instance, cytochrome c, a respiratory protein is found in all aerobic species whether

bacteria or humans.

8. Hardy Weinberg Theorem: -

1. It states that the frequencies of alleles and genotypes in

a population's gene pool remain constant over the generations unless acted upon by agents other than sexual recombination. So shuffling of alleles due to meiosis and random fertilization has no effect on the overall genetic structure of a population.

2. Hardy-Weinberg theorem is named for the two scientists who derived the principle independently in 1908.

3. G.H.Hardy and W.Weinberg proposed the relationship between the frequencies of the alleles and genotypes in

populations through their theorem.

4. They gave an equation which is expansion of binomial expression $(P+q)^2$, where P is the frequency

of one allele and q is the frequency of another allele. So the formula for the HardyWeinberg theorem is:

$$P^2 + 2pq + q^2 = 1$$

9. Difference Between the Endangered Species and Threatened Species: -

Endangered Species	Threatened Species
1. It is a species whose population is so small that it is in imminent danger of extinction throughout all or part of its range (where it lives).	1. It is a species in which population is small enough for it to be at risk of becoming extinct throughout all or part of its range, but not so small that it is in imminent danger of extinction.
2. An endangered species is likely to become extinct in near future.	2. A threatened species is likely to become endangered in near future.
3. Examples of endangered species include Morcopolo sheep, armored snail etc.	3. Examples of threatened species include gopher tortoise, bald eagle, gray wolf etc.

10. Names of Any Five Species Declared Extinct in Pakistan: -

1. Cheetah
2. Tiger
3. Asian lion
4. Cheer pheasant
5. Gavial

II) From Punjab Boards:-

LAHORE BOARD QUESTIONS

1. Define Hardy Weinberg Theorem.


(Lahore Board-2008-

- A) 2. What do you mean by endosymbiont hypothesis? (Lahore Board-2009-

- A) 3. What are vestigial organs? Give two examples. (Lahore Board-2009-

- A) 4. What are vestigial organs? Give example. (Lahore Board-2010-

- A) 5. What is function of eustachian tube?

- (Lahore Board-2010-
A)
6. Explain genetic drift. (Lahore Board-2010-
A)
7. Differentiate between homologous and analogous.
(Lahore Board-2011-
A)
8. Write names of theories of evolution presented by
Lamarck and Darwin. (Lahore Board-2011-
A)
9. What is genetic drift.? (Lahore Board-2011-
A)
10. Give the concept of fixed alleles.
(Lahore Borad-Group-I-2012-
A)
11. Define genetic drift. (Lahore Borad-Group-I-2012-
A)
12. Define homologous organs by giving example.
(Lahore Borad-Group-I-2012-
A)
13. What are vestigial organs? Give examples.
(Lahore Borad-Group-II-2012-
A)
14. How does biography provide evidence for evolution?
(Lahore Borad-Group-II-2012-
A)
15. Give the concept of Neo-Darwinism.
(Lahore Borad-Group-II-2012-
A)
16. Give the names of four factors affecting
genefrequency. (Lahore Borad-Group-I-2013-
A)
17. Define Hardy Weinberg Theorem and give
its
equation in the form of binomial expansion.
(Lahore Borad-Group-I-2013-
A)
18. Explain Hardy Weinberg Theorem.
(Lahore Borad-Group-II-2013-
A)
19. Differentiate between homologous and analogous.
(Lahore Borad-Group-II-2013-
A)
20. State theory of special creation.
(Lahore Borad-New Scheme-Group-I-2014-
A)
21. What is modern synthesis?
(Lahore Borad-New Scheme-Group-I-2014-
A)
22. Describe membrane invagination hypothesis of
eukaryotic cell division.
(Lahore Borad-New Scheme-Group-I-2014-
A)
23. Define fossils. Where are most of the fossils found?
(Lahore Borad-New Scheme-Group-II-2014-
A)
24. What are vestigial organs? Name some important
vestigial organs of man. 
(Lahore Borad-New Scheme-Group-II-2014-
A)

Answers

1. Hardy Weinberg Theorem: -

1. It is a mathematical prediction that allele frequencies do not change from generation to generation in a large population in the absence of microevolutionary processes (mutation, genetic drift, gene flow, natural selection)
2. A Hardy-Weinberg theorem provides a base line by which to judge whether evolution has occurred. Any change in allele frequencies in the gene pool of a population signifies that evolution has occurred.

2. Endosymbiont Hypothesis: -

1. Endosymbiont hypothesis proposes that eukaryotic cells evolved from a symbiosis between different species of prokaryotes.
2. This hypothesis was proposed by Lynn Margulis.
3. This hypothesis suggests that critical stage in the evolution of eukaryotic cells involved endosymbiotic relationships with prokaryotic organisms.
4. According to this hypothesis:
 - a. Energy producing small aerobic bacteria may have come to reside within larger anaerobic bacteria, eventually into what we know as mitochondria.
 - b. Photosynthetic bacteria may have come to reside within larger heterotrophic bacteria, leading to the evolution of chloroplasts.
 - c. Flagella arose by symbiosis. First spiral shaped bacteria called spirochetes could have attached themselves to a host cell and became the flagella.

3. A) Vestigial Organs: -

1. Vestigial organ is vesible evidence of structure that is present in an early stage in the evolution of an organism.
2. It is one of the sources of evidence for evolution.
3. They are retrogressive organs which were well developed and functional in their ancestors.
4. These vestigial structures are homologous to important structures found in other vertebrates where they were well-developed and serve useful function.

B) Two Examples: -

1. In whales and snakes pelvic bones are present in reduced form though both have no hind limbs for the attachment to these bones.
2. In man, appendix is a small finger like process that leads off from the intestine, has no known function. However, in other animals, such as rabbits, it is well developed and serves as a useful function in digestion.

4. A) Vestigial Organs: -

Vestigial organs or vestiges are those which have ceased to be of any use to their possessor but they persist in reduced form generation after generation.

B) Example: -

The wings of such flightless birds as kiwi and

ostrich are also examples of vestigial organs serving no useful function, but had neither been lost completely nor modified into different structures.

5. Function of Eustachian Tube: -

Eustachian tube connects the middle ear with the throat in humans.

6. Genetic Drift: -

1. It is the change in frequency of alleles at a locus that occurs by chance.
2. In small populations, such fluctuations may lead to the loss of particular alleles.
3. This may occur in a small population when few individual fail to reproduce and then genes are lost from the population.

7. Differences between Homologous and Analogous: -

Homologous	Analogous
1. They are functionally different but structurally alike.	1. They are functionally alike but structurally different.
2. They have a common evolutionary origin.	2. They are different in evolutionary origin.
3. They are the examples of divergent evolution.	3. They are the examples of convergent evolution.
4. Limbs of man, bat horse and whale are homologous organs.	4. Wings of bat, birds and insects are analogous organs.

8. A) Names of Theories of Evolution by Lamarck: -

1. Theory of Evolution
2. Inheritance of Acquired Characteristics

B) Names of Theories of Evolution by Darwin: -

1. Theory of Natural Selection and Adaptation
2. Descent with Modification

9. Genetic Drift: -

1. Genetic drift refers to changes in allele frequencies of a gene pool due to chance.
2. Changes in allelic frequencies in a population from one generation to another occur randomly.
3. It more likely occurs in small populations when only a few individuals of a population reproduce.

10. Concept of Fixed Alleles: -

If all members of a population are homozygous for the same allele, the allele is said to be fixed in the gene pool.

11. Genetic Drift: -

Genetic drift is the random fluctuations in the allele frequency in a small population from the accumulated effects of chance events. Or Genetic drift is random fluctuation in allele frequencies over time by chance. Or

The production of random evolutionary changes in small breeding populations is known as genetic drift.

12. A) Homologous Organs: -

1. Homologous organs are functionally different but

structurally alike.

2. They are examples of divergent evolution.

B) Example: -

The flower parts of a flowering plant are homologous. They are considered to have evolved from leaves, to form

sepals, petals, stamens and carpels.

13. A) Vestigial Organs: -

1. They are rudimentary organs.
2. They are remnants of formerly functional structures.
3. They are homologous to important structures found in other vertebrates where they were well developed and serve useful function.
4. The continued existence of vestiges (vestigial organs) that has no function for the animals generation after generation, can only be explained to be a sort of evolutionary baggage.

B) Examples: -

1. Ear muscles in man
2. Vermiform appendix in carnivores
3. Skeletons of whales and some snakes retain vestiges of the pelvis and leg bones of walking ancestors

14. Biogeography Providing Evidence for Evolution: -

1. The study of the past and present geographic distribution of organisms is called biogeography.
2. The geographic distribution of organism affects their evolution.
3. Darwin was interested in biogeography.
4. Darwin considered why species found on ocean islands

tend to resemble the species of the nearest mainland, even if the environment is different. He also

observed

that species on ocean islands do not tend to resemble species on islands with similar environments in other parts of the world.

5. Consider armadillos, the armored mammals that live only in America. The evolutionary view of biogeography predicts that contemporary armadillos are descendants of earlier species that occupied these continents, and the fossil record confirms that such ancestors existed.

15. Concept of Neo-Darwinism: -

With the birth of population genetics and its progress in 1930's, Mendalism and Darwinisms were reconciled, and genetic basis of variation and natural selection was worked out. Thus, a comprehensive theory of evolution was developed in the early

1940's that became known as neo-Darwinism. It is also called modern synthesis.

16. Names of Four Factors Affecting Gene Frequency: -

1. Mutation --- There must be no mutation, at least, the forward and backward mutation must be equal.
2. Migration ---- Migration of organisms (along with alleles leading to gene flow) in and out of the population (immigration and emigration) must not occur.
3. Genetic drift --- The population must be large so as to

minimize the effect of chance on changes in the allelic frequencies.

4. Non-random mating --- There must be random mating;
no genotype must have any mating preference.

17. A) Hardy Weinberg Theorem: -

It states that the frequencies of dominant and recessive alleles in a population will remain constant (unchanged) from generation to generation provided certain conditions exist. Or
It states that under stable conditions, allelic frequencies and their genotype ratios remain constant generation after generation.

B) Equation of Hardy Weinberg theorem: -

Equation of Hardy-Weinberg is an expansion of binomial expression $(P+q)^2$, where P is the frequency of one allele and q is the frequency of another allele. So the formula for the Hardy-Weinberg theorem is:
$$P^2 + 2pq + q^2 = 1$$

18. Hardy Weinberg Theorem: -

See Lahore Board Answer No: 17

19. Differences between Homologous and Analogous: -

See Lahore Board Answer No: 7

20. Theory of Special Creation: -

1. According to theory of special creation, all living things came into existence in their present forms especially and specifically created by nature.
2. Among the scientists who believed divine creation was
Carolus Linnaeus.

21. Modern Synthesis: -

An important turning point for the evolutionary theory was the birth of population genetics, which emphasizes the extensive genetic variation within populations and recognizes the importance of quantitative characters. With progress in population genetics in the 1930s, Mendelism and Darwinism were reconciled, and genetic basis of variation and natural selection was worked out. Thus, a comprehensive theory of evolution that became known as modern synthesis or Neo-Darwinism was developed in early 1940's. It is called synthesis because it integrated discoveries and ideas from many different fields, including palaeontology, taxonomy, biogeography, and of course population genetics.

22. Membrane Invagination Hypothesis: -

It proposes that the prokaryotic cell membrane invaginated (folded inward) to enclose copies of its genetic material. This invagination resulted in the formation of several double-membrane-bound entities (organelles) in a single cell. These entities could then have evolved into the eukaryotic mitochondrion,

nucleus, chloroplast etc.

23. A) Fossils: -

1. Fossils are either the actual remains or traces of the organisms that lived in the ancient geological times.
2. The organism may be embedded in sand, resin or ice.
3. Sometimes an impression or cast is made of the body parts, tissue being replaced or petrified by silica or calcium carbonate minerals. Or
Fossils are the preserved remains or traces of organisms which were living in the past.
2. The organism may be embedded in sand, resin or ice.
3. Sometimes remains of the organisms can be completely dissolved by ground water passing through but rock itself forms an impression around the organism. This is called fossil mould.
4. Sometimes the fossil mould is filled by silica or calcium carbonate forming a fossil cast.

B) Where Most of the Fossils Found: -

Most of the fossils are found in sedimentary rocks.

24. A) Vestigial Organs: -

They are remnants of more developed structures that were present and functional in ancestral organisms.

B) Names of Vestigial Organs of Man: -

1. A vermiform appendix --- A small finger like reduced caecum but in many grazing mammals, it is the part of digestive tract where cellulose is digested by microorganisms.
2. Ear muscles --- They are of little use in man whereas in other mammals as dogs and horses, they move the pinna of the ear to collect the sound waves from various directions.
3. Nictitating membrane --- It is highly reduced and folded performing no function but is well developed in birds to clean their eye ball.
4. Coccyx --- It is a tail bone (reduced tail) which is well developed in other vertebrates.

GUJRANWALA BOARD QUESTIONS

1. What do you mean by endosymbiont hypothesis?
(Gujranwala Board-2008-A)
2. Define genetic drift. (Gujranwala Board-2008-A)
3. What are homologous structures.
(Gujranwala Board-2008-A)
4. What do you mean by endosymbiont hypothesis?
(Gujranwala Board-2009-A)
5. Give two measures to protect endangered species.
(Gujranwala Board-2009-A)
6. Define homologous organs with example
(Gujranwala Board-2009-A)

7. Why Galapagos islands are famous?
(Gujranwala Board-2010-A)
8. Briefly explain Hardy Weinberg Theorem.
(Gujranwala Board-2010-A)
9. Define evolution.
(Gujranwala Board-2011-A)
10. What is Neo-Darwinism?
(Gujranwala Board-2011-A)
11. Explain briefly endosymbiont hypothesis.
(Gujranwala Board-2012-A)
12. Name any four species, declared extinct in Pakistan.
(Gujranwala Board-2012-A)
13. Differentiate between homologous and analogous organs.
(Gujranwala Board-2012-A)
14. Define genetic drift.
(Gujranwala Board-2013-A)
15. Define theory of Special Creation.
(Gujranwala Board-2013-A)
16. What is theory of Special Creation?
(Gujranwala Board-New Scheme-2014-A)
17. Differentiate between homologous and analogous organs.
(Gujranwala Board-New Scheme-2014-A)
18. Name any four species declared extinct in Pakistan.
(Gujranwala Board-New Scheme-2014-A)
19. What are hydrothermal vents?
(Gujranwala Board-New Scheme-2015-A)
20. Differentiate between natural and artificial selection.
(Gujranwala Board-New Scheme-2015-A)

Answers

1. Endosymbiont Hypothesis: -

- It states that certain organelles such as mitochondria and chloroplasts originated as symbiotic prokaryotes that lived inside the other, free-living, prokaryotic cells.
- It provides possible explanation of the evolution of eukaryotic organelles by phagocytosis of prokaryotes.

2. Genetic Drift: -

See Lahore Board Answer No: 7

3. Homologous Structure: -

- The structures that are anatomically similar but functionally different are termed as homologous structures. Or
The structures that have the same basic plan but not necessarily the same function are homologous.
- They are the structures with different appearances and functions.
- They all are derived from the same body part in the common ancestor.
- The evolutionary process that produces homologous

structures is called divergent evolution.

- The human arm, cat forelimb, whale flipper, and bat wing have a basic underlying similarity of structure because they are derived from a common ancestor.

4. Endosymbiont Hypothesis: -

See Exercise Chapter No: 24 Answer No: 8

5. Two Measures to Protect Endangered Species: -

- A natural system of national parks to protect large tracts of land wild life corridors that allow movement between natural areas.
- Protection of landscape and multiple-use area that allow controlled private activity but also retain value as a wild life habitat.

6. Homologous Organs with Example: -

See Gujranwala Board Answer No: 3

7. Galapagos Islands Famous For: -

Galapagos islands were famous for their fauna. Most of the species of Galapagos islands live nowhere else in the world, although they resemble species living on the South American mainland. Among the birds Darwin collected on the Galapagos were 13 types of finches that, although, quite similar, seemed to be different species. Some were unique to individual islands, while

other species were distributed on two or more islands that were close together.

8. Hardy Weinberg Theorem: -

- It is a mathematical description of the fact that allele and genotype frequencies remain constant in a random-mating population in the absence of inbreeding, natural selection, genetic drift, gene flow.
- It is usually stated:

If the frequency of allele a is p and the frequency of allele b is q , then genotype frequencies after one generation of random mating will always be

$$p^2 + 2pq + q^2 = 1$$

9. Evolution: -

Evolution is the theory that life arose by natural processes at an early stage of earth's history and that complex organisms developed from simple

organisms

by a process of gradual change. Or

Evolution is the transformation of the form and mode of existence of an organism in such a manner that descendants differ from their ancestors.

Or

Evolution is a progressive genetic change in allelic frequencies in a population.

10. Neo-Darwinism: -

Darwin theory has been greatly expanded as result of

our increasing knowledge of population genetics.

The

Darwin theory reappraised in terms of modern

genetics

(population genetics) is called neo-Darwinism.

11. Endosymbiont Hypothesis: -

See Exercise Chapter No: 24 Answer No: 8

12. Names of Any Four Species Declared Extinct in Pakistan: -

1. Indian rhino
2. Chher pheasant
3. Asian lion
4. Cheetah

13. Differences between Homologous and Analogous Organs: -

See Lahore Board Answer No: 7

14. Genetic Drift: -

See Lahore Board Answer No: 6

15. Theory of Special Creation: -

See Lahore Board Answer No: 20

16. Theory of Special Creation: -

1. According to theory of special creation:
 - a. God created all animals and plants.
 - b. All living things came into existence in their present forms especially and specifically created by nature and no change has occurred since then.
 - c. Because each species is fixed and immutable, propagating its own kind through generations by reproduction in between its members, thus never changed into different kinds or other species.
2. Carlous Linnaeus also belived in devine creation and fixity of species.
3. People believed in this theory till the middle 19th century.

17. Differences between Homologous and Analogous Organs: -

See Lahore Board Answer No: 7

18. Names of Any Four Species Declared Extinct in Pakistan: -

19. Hydrothermal Vents: -

See Exercise ChapterNo: 27 Answer No: 1

20. Differences Between Natural and Artificial Selection: -

Natural Selection	Artificial Selection
1. Natural selection is a process in which population changes over time and the frequency of favorable traits increases in successive generations whereas less favourable traits become scarce or disappear.	1. Artificial selection means intentional breeding between individuals for certain traits, or combination of traits.
2. In natural selection, nature determines which members of a population reproduce to a greater degree than other members.	2. In artificial selection, a breeder selects the animals and plants to reproduce.
3. The result of the natural selection is not predesired.	3. The result of artificial selection is predesired.
4. In natural selection, the environment selects or rejects variations.	4. In artificial selection, humans favour specific variations for selection
5. Natural selection is capable of considerable modifications of species in	5. Artificial selection produces so many changes in a species in relatively short period of time.

hundreds of million years.

MULTAN BOARD QUESTIONS

1. Evolution is a remodeling process. Comment.
(Multan Board-2008-A)
2. What is difference between endangered species and threatened species.
(Multan Board-2008-A)
3. What are Vestegial Organs? Give two examples.
(Multan Board-2008-S)
3. What are Hydrothermal Vents?(Multan Board-2009-A)
4. What do you mean by inheritance of acquired characters?
(Multan Board-2009-A)
5. Briefly explain Genetic Drift. (Multan Board-2009-S)
6. Define Hydrothermal Vent. (Multan Board-2009-S)
7. What are endangered species? (Multan Board-2010-A)
8. Define Biogeograhly. (Multan Board-2010-A)
9. Discuss the significance of archeobacteria in evolution.
(Multan Board-2010-S)
10. How did mitochondria evolve according to Endosymbiont Hyothesis? (Multan Board-2010-S)
11. Define Theory of Special Creation.
(Multan Board-2011-A)
12. What are Homologous Structures? Give examples.
(Multan Board-2011-A)
13. State Hardy Weinberg Theorem.
(Multan Board-2011-S)
14. What are vestigial Organs? Give examples.
(Multan Board-2011-S)
15. Differentiate between Homology and Analogy.
(Multan Board-2012-A)
16. What are Vestigial Organs? Give examples.
(Multan Board-2012-A)
17. Explain Genetic Drift. (Multan Board-2012-A)
18. Write a note on Genetic Drift. (Multan Board-2012-A)
19. Differentiate between homologous and analogous organs.
(Multan Board-2012-A)
20. What is Endosymbiont Hypothesis?
(Multan Board-2013-A)
21. Differentiate between Endangered Species and Threatened Species.
(Multan Board-2013-A)

22. How are Evolutionary relationships reflected in DNA and Proteins? (Multan Board-Old Scheme-2014)
23. Differentiate between Homologous and Analogous Organs. (Multan Board-Old Scheme-2014)
24. What is Endosymbiont Hypothesis? (Multan Board-Old Scheme-2014)
25. Define Theory of Special Creation. (Multan Board-New Scheme-2014)
26. What are Hydrothermal Vents? (Multan Board-New Scheme-2014)
27. What do you know about Hydrothermal Vent? (Multan Board-New Scheme-2015-A)
28. Define Theory of Special Creation. (Multan Board-New Scheme-2015-A)

Answers

- 1. Evolution, A Remodeling Process: -**
Evolution is a remodeling process in which ancestral structures that functioned in one capacity become modified as take on new functions. It is supported by comparative anatomy.
- 2. Difference between Endangered Species and Threatened Species: -**
See Exercise Chapter No: 24 Answer No: 9
- 3. Vestigial Organs with Two Examples:-**
See Exercise Chapter No: 24 Answer No: 6
- 3. Hydrothermal Vents: -**
See Exercise Chapter No: 27 Answer No: 1
- 4. Inheritance of Acquired Characters: -**
- The concept of inheritance of acquired characters was proposed by Lamarck.
 - In this concept of heredity, the modifications an organism acquires during its life time can be passed on along to its offspring e.g. the long neck of the giraffe.
- 5. Genetic Drift: -**
See Lahore Board Answer No: 7
- 6. Hydrothermal Vent: -**
See Exercise Chapter No: 27 Answer No: 1
- 7. Endangered Species: -**
- A species whose numbers are so severely reduced that it is in imminent danger of extinction throughout all or part of its range (where it lives) is called endangered species.
 - Indus dolphin, Marco Polo sheep, Houbara bustard, Black buck, Common leopard, Great Indian bustard, White-headed duck, and Marbled teal are few examples of Endangered Species in Pakistan.
- 8. Biogeography: -** ▲
- It is the study of geographic distribution of life on earth. Or
Study of the geographical distribution of organisms is called biogeography. Or

- It is the study of the past and present geographic distributions of organisms.
- Biogeographics attempt to explain the factors that influence where species of plants and animals live on earth.
 - The geographic distribution of organisms affects their evolution.
 - Biogeography had a powerful influence on Darwin and made him think that adaptation to the environment accounts for diversification; one species can give rise to many species, each adapted differently.
- 9. Significance of Archeobacteria in Evolution: -**
Archeobacteria are found in hydrothermal vents and can tolerate temperatures upto 120 °C and support vent hypothesis that origin of life may have begun in hydrothermal vents.
- 10. Evolution of Mitochondria According to Endosymbiont Hypothesis: -**
According to endosymbiont hypothesis, energy producing aerobic prokaryotes may have come to reside within large anaerobic bacteria, eventually evolving into mitochondria.
- 11. Theory of Special Creation: -**
See Lahore Board Answer No: 20
- 12. A) Homologous Structures: -**
They are functionally different but structurally alike.
- B) Examples: -**
Fore limbs of man, bat, horse whale etc are homologous structures.
- 13. Hardy Weinberg Theorem: -**
See Exercise Chapter No: 24 Answer No: 8
- 14. Vestigial Organs with Examples: -**
See Lahore Board Answer No: 14
- 15. Differences between Homology and Analogy: -**
- | Homology | Analogy |
|--|---|
| 1. Similarity in different species that result from their deviation from a common ancestor is called homology. | 1. Similarity in different species that result from independent development of unrelated organisms is called analogy. |
| 2. It describes structures that are different in functions but have common evolutionary origin. | 2. It describes structures that are similar in functions but are different in evolutionary origin. |
| 3. Homology is the result of divergent evolution. | 3. Analogy is the result of convergent evolution. |
- 16. Vestigial Organs with Examples: -**
See Lahore Board Answer No: 14
- 17. Genetic Drift: -**
See Lahore Board Answer No: 6
- 18. Note on Genetic Drift: -**
See Lahore Board Answer No: 6
- 19. Differences between Homologous and Analogous Organs: -**
See Lahore Board Answer No: 7
- 20. Endosymbiont Hypothesis: -**
See Exercise Chapter No: 24 Answer No: 8
- 21. Differences between Endangered Species and**

Threatened Species: -

See Exercise Chapter No: 24 Answer No: 9

22. Evolutionary Relationships Between DNA and Proteins: -

See Exercise Chapter No: 24 Answer No: 7

23. Differences between Homologous and Analogous Organs: -

See Lahore Board Answer No: 7

24. Endosymbiont Hypothesis: -

See Exercise Chapter No: 24 Answer No: 8

25. Theory of Special Creation: -

See Lahore Board Answer No: 20

26. Hydrothermal Vents: -

See Exercise ChapterNo: 27 Answer No: 1

27. Hydrothermal Vents: -

See Exercise ChapterNo: 27 Answer No: 1

28. Theory of Special Creation: -

See Lahore Board Answer No: 20

BAHAWALPUR BOARD QUESTIONS**1. What are endangered species?**

(Bahawalpur Board-2008-

A)

2. What are Hydrothermal Vent?

(Bahawalpur Board-2009-

A)

3. Define Evolution.

(Bahawalpur Board-2009-

A)

4. Differentiate between Homology and Analogy.

(Bahawalpur Board-2009-

A)

5. How Homologous Organs are different from Analogous Organs?

(Bahawalpur Board-2010-

A)

6. Define Hydrothermal Vents.

(Bahawalpur Board-2010-

A)

7. Why the species become endangered?

(Bahawalpur Board-2010-

A)

8. What is Genetic Drift?

(Bahawalpur Board-2011-

A)

9. How Convergent Evolution differ from Divergent Evolution?

(Bahawalpur Board-2011-

A)

10. Define with examples Homologous and Analogous Organs.

(Bahawalpur Board-2012-

A)

11. Define Hardy Weinberg Theorem.

(Bahawalpur Board-2012-

A)

12. Define Species.

(Bahawalpur Board-2012-

A)

13. How Molecular Biology is an important evidence of Evolution?

(Bahawalpur Board-2013-

A)

14. What are Analogous Structures? Give an example.

(Bahawalpur Board-2013-

A)

15. Explain Endosymbiont Hypothesis.

(Bahawalpur Board-New Scheme-2014-

A)

16. Differentiate between Homologous Organs and Analogous Organs.

(Bahawalpur Board-New Scheme-2014-

A)

17. Name any four factors affecting Gene frequency.

(Bahawalpur Board-New Scheme-2014-

A)

18. Differentiate Homologous and Analogous Organs.

(Bahawalpur Board-New Scheme-2015-

A)

19. What are fossils? Where they are found?

(Bahawalpur Board-New Scheme-2015-

A)

Answers**1. Endangered Species: -**

See Multan Board Answer No: 7

2. Hydrothermal Vent: -

See Exercise ChapterNo: 27 Answer No: 1

3. Evolution: -

1. Evolution refers to the process that have transformed life on earth from its earliest forms to the vast diversity.

2. Evolutionary change is based mainly on the interactions between populations of organisms and their environments. Or Evolution is defined as the accumulation of inherited changes within population over time. Or Evolution refers to both descent with modification and

adaptation to the environment. Or

1. The word evolution refers to the gradual development of something.

2. The evolution with reference to plants or animals or both is referred to as organic evolution.

3. Broadly, evolution can be said to be the development of an entity in the course of time through gradual sequence of changes from simplex to complex state.

4. Darwin defined evolution as descent with modification.

4. Differences between Homology and Analogy: -

See Multan Board Answer No: 15

5. Homologous Organs are Different from Analogous**Organs: -**

See Lahore Board Answer No: 7

6. Hydrothermal Vents: -

See Exercise ChapterNo: 27 Answer No: 1

7. Species Become Endangered: -

1. The species become endangered because of habitat destruction. The tropical rain forests have been reduced to 44 % of the original extent. In certain areas, such as

Ecuador, forest coverage has been reduced by 95%. This decrease in habitat has resulted in tens of thousands of extinction, deriving many of them to the

verge of extinction (endangered). Reduction of habitats

other than rain forests—grass lands, marshes, deserts,

and coral reefs --- is also the cause of species becoming endangered.

2. Other causes of species becoming endangered include
climate change, pollution and invasions from foreign species.

8. Genetic Drift: -

See Lahore Board Answer No: 6

9. Convergent Evolution Different from Divergent Evolution: -

Convergent Evolution	Divergent Evolution
1. It is the evolution in which basic similarity of organisms is diverged during evolution and departed from a common ancestral form.	1. It is the acquisition of the same or similar characters in distantly related lines of descent.
2. It is an evolutionary process that produces homologous organs.	2. It is an evolutionary process that produces analogous organs.

10. A) Homologous Organs with Examples: -

See Gujranwala Board Answer No: 3

B) Analogous Organs with Examples: -

See Bahawalpur Board Answer No: 14

11. Hardy Weinberg Theorem: -

See Exercise Chapter No: 24 Answer No: 8

12. Species: -

1. Species is a group of populations that have the potential to interbreed in nature.
2. Each species has a geographical range within which individuals are not spread out evenly, but are usually concentrated in several localized populations.

13. Molecular Biology is An Important Evidence of Evolution: -

1. Molecular biology has provided strong evidence in support of evolution as the basis for the unity and diversity of life.
2. Evolutionary relationships among species are reflected in their DNA (genes) and proteins (gene products).
 - a. When there are two species that have genes and proteins with matching sequence of monomers, the sequence must have been copied from a common ancestor.
 - b. Taxonomically remote organisms, such as humans and bacteria, have some common proteins in common.

Examples: -

- i. A common genetic code brings evidence that all life is related.
- ii. Cytochrome c, a respiratory protein is found in all aerobic species whether bacteria or humans.

14. A) Analogous Structures: -

1. Analogous organs are functionally alike but structurally different.
2. They are the examples of convergent evolution.

B) An Example: -

Wings of bat, birds and insects are analogous.

15. Endosymbiont Hypothesis: -

See Exercise Chapter No: 24 Answer No: 8

16. Differences between Homologous Organs and Analogous Organs: -

See Lahore Board Answer No: 7

17. Names Any Four Factors Affecting Gene

Frequency: -

See Lahore Board Answer No: 16

18. Differences between Homologous and Analogous Organs: -

See Lahore Board Answer No: 7

19. A) Fossils and Where are They Found: -

See Lahore Board Answer No: 23

FAISALABAD BOARD QUESTIONS

1. What is Hardy-Weinberg theorem?
(Faisalabad Board-2008-
A)
2. Explain the term homology with suitable example.
(Faisalabad Board-2008-
A)
3. Define Darwinism.
(Faisalabad Board-2008-
A)
4. Explain homologous character with the help of an example.
(Faisalabad Board-2009-
A)
5. Differentiate between endangered species and threatened species.
(Faisalabad Board-2009-
A)
6. If in a wild flower population $p = 0.8$, Calculate $P^2 + 2pq + q^2 = 1$.
(Faisalabad Board-2010-
A)
7. Differentiate between homologous and analogous organs.
(Faisalabad Board-2010-
A)
8. Explain endosymbiont hypothesis.
(Faisalabad Board-2010-
A)
9. What is genetic drift? Explain.
(Faisalabad Board-2011-
A)
10. Define neodarwinism.
(Faisalabad Board-2012-
A)
11. How in endangered species are distinct from extinct species?
(Faisalabad Board-2012-
A)
12. Name any four factors affecting gene frequency.
(Faisalabad Board-2012-
A)
13. Differentiate between Endangered and threatened species.
(Faisalabad Board-2013-
A)
14. What are hydrothermal vents?
(Faisalabad Board-2013-
A)
15. What are homologous organs?
(Faisalabad Board-Old Scheme-2014-
A)
16. Define genetic drift.
(Faisalabad Board-Old Scheme-2014-
A)
17. Define endosymbiont hypothesis.
(Faisalabad Board-Old Scheme-2014-
A)
18. What is the theory of special creation?
(Faisalabad Board-New Scheme-2014-
A)
19. Differentiate between endangered and extinct species.

(Faisalabad Board-New Scheme-2014-

A)

20. Give two ways to protect endangered species.

(Faisalabad Board-New Scheme-2015-

A)

21. What is genetic drift? Give its effects.

(Faisalabad Board-New Scheme-2015-

A)

Answers**1. Hardy Weinberg Theorem: -**

See Exercise Chapter No: 24 Answer No: 8

2. A) Homology: -

1. Similarity in different species that result from their deviation from a common ancestor is called homology.

Or

It is the similarity of parts or organs of different organisms caused by evolutionary deviation from a corresponding part or organ in a remote ancestor and usually having a similar embryonic origin.

2. The features that exhibit such similarity are called homologous organs.

3. It describes structures that have common evolutionary origin.

4. Homology supports theory of organic evolution.

B) Example: -

Consider the limb bones of mammals. A human arm,

a

cat forelimb, a whale front flipper, and a bat wing, although quite different in appearance, have strikingly similar arrangement of bones, muscles, and nerves.

3. Darwinism: -

1. Darwinism means Theories of Evolution proposed by

Darwin.

a. Natural Selection and Adaptation: -

Natural selection is a process by which organisms which are better adapted to their environment tend to have an increased chance of survival; they therefore have a greater opportunity to reproduce, and pass on their offspring those genetically determined characteristics which cause them to be better adapted.

b. Descent with Modification: -

Darwin believed in in perceived unity in life, with all organisms through descent from some common ancestor that lived in the remote past.

4. Homologous Character with An Example: -

See Gujranwala Board Answer No: 3

5. Differences between Endangered Species and Threatened Species: -

See Exercise Chapter No: 24 Answer No: 9

6. Activity: -

If in a wild flower populating $p = 0.8$, Calculate $P^2 + 2pq + q^2 = 1$.

7. Differences between Homologous and Analogous Organs: -

See Lahore Board Answer No: 7

8. Endosymbiont Hypothesis: -

See Exercise Chapter No: 24 Answer No: 8

9. Genetic Drift: -

See Lahore Board Answer No: 6

10. Neo-Darwinism: -

See Lahore Board Answer No: 15

11. Endangered Species Distinct From Extinct Species:-

Endangered Species	Extinct Species
1. This species is at the risk of extinction in near future.	1. This species no longer lives in an ecosystem.
2. Its some members live in the ecosystem.	2. Its last member has died.
Example:- Morcopolo sheep	Example:- Asian lion

12. Names of Any Four Factors Affecting Gene Frequency: -

1. Mutation
2. Migration
3. Genetic drift
4. Selection

13. Differences between Endangered and Threatened Species: -

See Exercise Chapter No: 24 Answer No: 9

14. Hydrothermal Vents: -

See Exercise Chapter No: 27 Answer No: 1

15. Homologous Organs: -

See Gujranwala Board Answer No: 3

16. Genetic Drift: -

1. Genetic drift is a change in the allelic frequency in a small breeding population.
2. It leads to loss of an allele from the population.

17. Endosymbiont Hypothesis: -

See Exercise Chapter No: 24 Answer No: 8

18. Theory of Special Creation: -

See Lahore Board Answer No: 20

19. Differences between Endangered and Extinct Species: -

See Faisalabad Board Answer No: 11

20. Two Ways to Protect Endangered Species: -

See Gujranwala Board Answer No: 5

21. A) Genetic Drift: -

Genetic drift is a change in the allelic frequency in a small breeding population.

B) Effects of Genetic Drift: -

It leads to loss of an allele from the population.

RAWALPINDI BOARD QUESTIONS

1. Define species. (Rawalpindi Board-2011-A)

2. Differentiate between homologous and analogous organs. (Rawalpindi Board-2011-A)

3. Define hydrothermal vents. (Rawalpindi Board-2012-A)

4. Define modern synthesis. (Rawalpindi Board-2012-A)

5. Name the species declared as extinct in Pakistan. (Rawalpindi Board-2012-A)

6. Define Neo-Darwinism. (Rawalpindi Board-2013-A)

7. Define analogous organs and give an example.

(Rawalpindi Board-2013-

- A)
 8. Explain genetic drift as factor affecting gene frequency. (Rawalpindi Board-New Pattern-2014)
 9. How molecular biology provides an evidence for evolution? (Rawalpindi Board-New Pattern-2014)
 10. What are homologous and analogous organs? (Rawalpindi Board-New Pattern-2014)
 11. What is Neo-Darwinism? (Rawalpindi Board-New Pattern-2015)
 12. Differentiate between Endangered and Threatened Species. (Rawalpindi Board-New Pattern-2015)

Answers**1. Species: -**

1. Species is a group of organisms whose members are sufficiently alike to be able, or potentially able, to reproduce and produce fertile offspring, and are unable to reproduce with other such groups. Or
 A species is a group of organisms that are actually or potentially able to interbreed to produce fertile offspring and which cannot interbreed with other such groups.
 Or
 Species is one or more populations whose members

are capable of interbreeding in nature to produce fertile offspring and do not interbreed with members of other species.

2. Members of the same species are potentially capable of contributing to the same gene pool.

2. Differences between Homologous and Analogous Organs: -

See Lahore Board Answer No: 7

3. Hydrothermal Vents: -

See Exercise Chapter No: 27 Answer No: 1

4. Modern Synthesis: -

1. With the progress in population genetics in 1930s, Mendalism and Darwinisms were reconciled, and genetic basis of variation and natural selection was worked out. Thus, a comprehensive theory of evolution was developed in the early 1940's called modern synthesis, as it integrated discoveries and ideas from many different fields, including palaeontology, taxonomy, biogeography, and of course, population genetics.

2. It is also called neo-Darwinism.

5. Names of Species Declared as Extinct in Pakistan: -

See Exercise Chapter No: 24 Answer No: 10

6. Neo-Darwinism: -

See Lahore Board Answer No: 15

7. A) Analogous Organs: -

1. These are the structures that are similar in function but

different in evolutionary origin. Or
 Structures that are similar in function but have evolved independently from different origins are called analogous structures.
 2. They have the same structures in different groups but do not have a common ancestry.

B) Example: -

Wing of a bat and wing of a butterfly.

8. Genetic Drift as Factor Affecting Gene**Frequency:**

1. Genetic drift is the change in frequency of alleles at a locus that occurs by chance.
 2. In small populations, such fluctuations may lead to the loss of particular alleles.
 3. Genetic drift occurs in a small population when a few individuals fail to reproduce and then genes are lost from the population.

9. Molecular Biology Providing an Evidence for Evolution: -

See Multan Board Answer No: 13

10. A) Homologous: -

These are the organs which are functionally different but structurally alike, such as forelimbs of bat man, horse and whale.

B) Analogous Organs: -

These are the organs which are functionally alike but structurally different such as wings of bat, birds and insects.

11. Neo-Darwinism: -

See Lahore Board Answer No: 15

12. Differences between Endangered and Threatened Species: -

See Exercise Chapter No: 24 Answer No: 9

SARGODHA BOARD QUESTIONS

1. What is the membrane invagination hypothesis? (Sargodha Board-2010-
 A)
 2. Define evolution. Name the evolutionist who gave the theory of inheritance of acquired characteristics. (Sargodha Board-2010-
 A)
 3. Give the concept of fixed alleles. (Sargodha Board-2011-
 A)
 4. Differentiate between homologous and analogous organs. (Sargodha Board-2011-
 A)
 5. Give two contributions of Cuvier. (Sargodha Board-2012-
 A)
 6. Write a note on theory of natural selection. (Sargodha Board-2012-
 A)
 7. Describe vestigial organs. Give two examples. (Sargodha Board-2013-
 A)
 8. Define endosymbiont hypothesis.

- (Sargodha Board-2013-
A)
9. What are vestigial organs? Give one example.
(Sargodha Board-New Scheme-2014-
A)
10. Define genetic drifts and give its effects.
(Sargodha Board-New Scheme-2014-
A)

Answers

1. **Membrane Invagination Hypothesis:** -
See Lahore Board Answer No: 22
2. **A) Evolution:** -
1. Evolution means change over time.
2. Biological or organic evolution is a series of changes in the genetic composition of a population over time.
- B) **Name of the Evolutionist Who Gave the Theory of Inheritance of Acquired Characteristics:** -
Jean Baptiste Lamarck
3. **Concept of Fixed Alleles:** -
If all the members of a population are homozygous for the same allele, that allele is said to be fixed in the gene pool.
4. **Differences between Homologous and Analogous Organs:** -
See Lahore Board Answer No: 7
5. **Two Contributions of Cuvier:** -
1. He contributed much to the science of Palaeontology.
2. He explained Earth's history by catastrophism.
6. **A Note on Theory of Natural Selection:** -
Darwin's theory of natural selection was based on the following observations:
a. Production of more individuals than the environment supports, leads to a struggle for existence among individuals of a population, with only a fraction of offspring surviving each generation.
b. Survival in the struggle for existence is not random, but depends in part on the breeding constitution of the surviving individuals. Those individuals whose inherited characteristics fit them best to their environment are likely to leave the more offspring than the lessfit individuals.
c. This unequal ability of individuals to survive and reproduce will lead to a gradual change in a population, with favorable characteristics accumulating over the generation, thus leading to the evolution of new species. Or
1. Darwin proposed the theory of natural selection as the mechanism of evolution.
2. Natural selection produces evolutionary change when some individuals in a population possess certain inherited characteristics and produce more surviving offspring than individuals lacking these characteristics.
As a result, the population gradually comes to include

- more and more individuals with the advantageous characteristics. In this way, population evolves and becomes better adapted to its local circumstances.
7. **Vestigial Organs with Two Examples:-**
See Exercise Chapter No: 27 Answer No: 6
 8. **Endosymbiont Hypothesis:** -
See Exercise Chapter No: 24 Answer No: 8
 9. **Vestigial Organs with One Example:** -
See Lahore Board Answer No: 5
 10. **A) Genetic Drift:** -
It is the random changes in allelic frequency in a small population due to chance.
 - B) **Effects of Genetic Drift:** -
1. Genetic drift may lead to loss of particular allele. One allele may be eliminated from the population purely by chance, regardless of whether that allele is beneficial, harmful, or of no particular advantage or disadvantage.
2. When genetic drift leads to a loss of one or more alleles for a gene locus, a particular allele may become fixed in the population over time.
3. Genetic drift decreases genetic variation within a population, although it tends to increase genetic differences among different populations.
- ### DERA GHAZI KHAN BOARD QUESTIONS
1. Explain endosymbiont hypothesis.
(D.G.K. Board-2009-
A)
 2. What are vestigial organs? Give examples.
(D.G.K. Board-2009-
A)
 3. What are hydrothermal vents? D.G.K. Board-2010-
A)
 4. Explain the convergent evolution.
(D.G.K. Board-2010-
A)
 5. Differentiate between homologous and analogous organs.
(D.G.K. Board-2010-
A)
 6. Differentiate between Convergent and Divergent Evolution.
(D.G.K. Board-2011-
A)
 7. Name some species of animals that are declared as extinct in Pakistan.
(D.G.K. Board-2011-
A)
 8. What is the role of geographical barriers in evolution?
(D.G.K. Board-Group-I-2012-
A)
 9. Differentiate between homologous and analogous organs.
(D.G.K. Board-Group-I-2012-
A)
 10. Define endosymbiont hypothesis.
(D.G.K. Board-Group-II-2012-
A)
 11. Write about vestigial organs.
(D.G.K. Board-Group-II-2012-
A)
 12. Write down two measures to preserve endangered

- species. (D.G.K. Board-Group-II-2012-A)
13. Give measures to protect endangered species. (D.G.K. Board-Group-I-2013-A)
14. Differentiate between Homologous and Analogous organs. (D.G.K. Board-Group-I-2013-A)
15. What are vestigial organs? Give example. (D.G.K. Board-Group-II-2013-A)
16. What do you mean by endosymbiont hypothesis? Give example. (D.G.K. Board-Group-II-2013-A)
17. Differentiate between homology and analogy. (D.G.K. Board-New Scheme-Group-I-2014-A)
18. What are endangered species? Give example. (D.G.K. Board-New Scheme-Group-I-2014-A)
19. What is genetic drift? (D.G.K. Board-New Scheme-Group-II-2014-A)
20. Differentiate between homologous and analogous organs. (D.G.K. Board-New Scheme-Group-II-2014-A)
21. Suggest any two plans for the conservation of endangered species. (D.G.K. Board-New Scheme-Group-II-2014-A)
22. Give the steps involved in membrane invagination hypothesis. (D.G.K. Board-New Scheme-Group-I-2015-A)
23. What is the role of migration in affecting gene frequency? (D.G.K. Board-New Scheme-Group-I-2015-A)
24. What is endosymbiont hypothesis? (D.G.K. Board-New Scheme-Group-II-2015-A)
25. Differentiate between endangered and threatened species. (D.G.K. Board-New Scheme-Group-II-2015-A)

Answers

- 1. Endosymbiont Hypothesis: -**
See Exercise Chapter No: 24 Answer No: 8
- 2. Vestigial Organs with Examples: -**
See Lahore Board Answer No: 14
- 3. Hydrothermal Vents: -**
- Hydrothermal vents are hot springs in the seafloor along the ocean ridges.
 - At hydrothermal vents seawater percolates through cracks and is heated to 350 °C, causing sulfate to react with hydrogen water and form hydrogen sulfide (H₂S).
 - Here chemosynthetic bacteria support a community of varied organisms.

- It is speculated that origin of life may have begun in these hydrothermal vents.
- Presence of archaeobacteria supports this vent hypothesis.

4. Convergent Evolution: -

- Evolution by means of Natural Selection suggests that under similar environmental conditions, unrelated organisms might develop organs which superficially resemble each other in structure because they perform similar function. This evolutionary process is called convergent evolution. Such organs are called analogous organs. Or The independent evolution of similar structures in distantly related organisms is known as convergent evolution. Or It is the evolution of superficial phenotypic similarity of form as a result of similar selection pressure. Or It is the independent development of similar structures

in organisms that are not directly related.

- It often occurs in organisms living in similar environment.
- Wings of bat, birds and insects are examples of convergent evolution.

5. Differences between Homologous and Analogous Organs: -

See Lahore Board Answer No: 7

6. Differences between Convergent and Divergent Evolution: -

See Bahawalpur Board Answer No: 9

7. Names of Some Species of Animals that are Declared as Extinct in Pakistan: -

See Exercise Chapter No: 24 Answer No: 10

8. Role of Geographical Barriers in Evolution: -

Geographical barriers lead to reproductive isolation between species hence preventing genetic exchange between species. As a result of geographical barriers entirely different types of characters are produced between species. Moreover if population is small enough then there be the chance of genetic drift

of one or more alleles.

9. Differences between Homologous and Analogous Organs: -

See Lahore Board Answer No: 7

10. Endosymbiont Hypothesis: -

See Exercise Chapter No: 24 Answer No: 8

11. Vestigial Organs: -

See Exercise Chapter No: 24 Answer No: 6

12. Two Measures to Preserve Endangered Species: -

1. Landscape Preservation: -

Protected landscapes and multiple-use areas that allow

controlled private activity but also retain value as a wild life habitat.

2. Habitat Restoration: -

Quite different sorts of habitat restoration might be undertaken, depending upon the cause of habitat loss.

a. Removing Introduced Species: -

Some times the habitat of a species has been destroyed

by a single introduced species. In such a case, habitat restoration involves removing of introduced species.

b. Cleanup and Rehabilitation: -

Habitat seriously degraded by chemical pollution can

not be restored until the pollution is cleaned up.

13. Measures to Protect Endangered Species: -
Following measures can be taken to protect endangered species:

1. Habitat Preservation: -

Preserving forests and other hotspots will save a wide

variety of organisms.

2. Landscape Preservation: -

Landscape protection for one species is often beneficial for other wildlife that share the same space.

3. Habitat Restoration: -

Habitat restoration can involve many actions, including removal of introduced species, and cleanup

and rehabilitation.

4. Conservation of Ecosystem: -

Conservation efforts are increasingly being turned toward preserving large tracts of land over long periods of time in order to preserve intact ecosystems rather than individual or particular species.

14. Differences between Homologous and Analogous Organs: -

See Lahore Board Answer No: 7

15. Vestigial Organs with Examples: -

See Lahore Board Answer No: 14

16. Endosymbiont Hypothesis with Example: -

See Exercise Chapter No: 24 Answer No: 8

17. Differences between Homology and Analogy: -

See Multan Board Answer No: 15

18. A) Endangered Species: -

It is a species that is in peril of immediate extinction throughout all or most of its range.

B) Example: -

Indus dolphin

19. Genetic Drift: -

See Lahore Board Answer No: 6

20. Differences between Homologous and Analogous Organs: -

See Lahore Board Answer No: 7

21. Any Two Plans for the Conservation of Endangered Species: -

1. Zoo's, Safaris, and botanical gardens to save species whose extinction is imminent.

2. Protection of landscapes that allow controlled activity.

22. Steps Involved in Membrane Invagination Hypothesis: -

1. A prokaryotic cell duplicates its genetic material (genome).

2. The plasma membrane invaginates to form double membrane-bound organelles.

3. The individual genomes separate from each other.

4. The nuclear genome eventually enlarges while other organelle genomes lose many of their genes, resulting in a eukaryotic cell.

23. Role of Migration in Affecting Gene Frequency: -

1. Migration is a very potent agent of change.

2. Migration locally acts to prevent evolutionary changes

by preventing populations that exchange members from diverging from one another.

3. Emigration and immigration of members of a population, cause disturbance in the gene pool

Or

1. Migration leads to change the gene pool of various populations.

2. Because of each population is isolated to some extent

from other populations, they have distinct genetic traits and gene pools. But both types of migration,

that

is, emigration (a type of migration in which individuals leave the population decreasing its size)

and immigration (a type of migration in which individuals enter the population increasing its size) cause disturbance in the gene pool of the population due to corresponding movement of alleles or gene flow.

3. Migration enhances the spread of the advantageous alleles through species.

24. Endosymbiont Hypothesis: -

See Exercise Chapter No: 24 Answer No: 8

25. Differences Between Endangered and Threatened Species: -

See Exercise Chapter No: 24 Answer No: 8

SAHIWAL BOARD QUESTIONS

1. Describe vestigial organs with examples.

(Sahiwal Board-2013-

A)

2. What is concept of special creation?

(Sahiwal Board-Old Scheme-2014-

A)

3. What do you mean by inheritance of acquired characteristics? (Sahiwal Board-Old Scheme-2014-

A)

4. Name the factors affecting gene frequency.

(Sahiwal Board-Old Scheme-2014-

A)

5. Name the factors affecting gene frequency.

(Sahiwal Board-New Scheme-2014-

A)

6. Define endosymbiont hypothesis.

(Sahiwal Board-New Scheme-2014-

A)

7. Name two reptiles which have been declared extinct in

Pakistan.

(Sahiwal Board-New Scheme-2014-

A)

8. Differentiate between homology and analogy.

(Sahiwal Board-New Scheme-2014-

A)

9. What are vestigial organs? Give examples.

(Sahiwal Board-New Scheme-2014-

A)

Answers

1. Vestigial Organs with Examples: -

See Lahore Board Answer No: 14

2. Concept of Special Creation: -

See Lahore Board Answer No: 20

3. Inheritance of Acquired Characteristics: -

1. This theory was proposed by Lamarck.
2. According to Lamarck, individuals passed on to offspring body and behavior changes acquired during their lives.
3. Lamarck proposed that ancestral giraffes with short necks tended to stretch their necks to feed on tree leaves, and this extension of the neck was passed on

to subsequent generations leading to long-necked giraffe.

4. Names of Factors Affecting Gene Frequency: -

1. Mutation
2. Migration
3. Genetic drift
4. Non-random mating
5. Selection

5. Names of Factors Affecting Gene Frequency: -

1. Mutation --- There must be no mutation, at least, the forward and backward mutation must be equal.
2. Migration ---- There must be no migration of individuals into and out of a population, hence there must not be exchange of alleles with other population that might have other allelic frequencies.

3. Genetic drift --- The population must be large in which changes in allelic frequencies due to chance alone are insignificant.

4. Non-random mating --- There must be random mating; each individual in a population must have an equal chance of mating with any individual of the opposite sex.
5. Selection --- There must be no selection, all genotypes must have equal likelihood of survival and mating success.

6. Endosymbiont Hypothesis: -

See Exercise Chapter No: 24 Answer No: 8

7. Names of Two Reptiles Declared Extinct in Pakistan: -

1. Gavial
2. Crocodile

8. Differences between Homology and Analogy: -

See Multan Board Answer No: 15

9. Vestigial Organs with Examples: -

See Lahore Board Answer No: 14

C h a p t e r ----

25

ECOSYSTEM

3 SQs

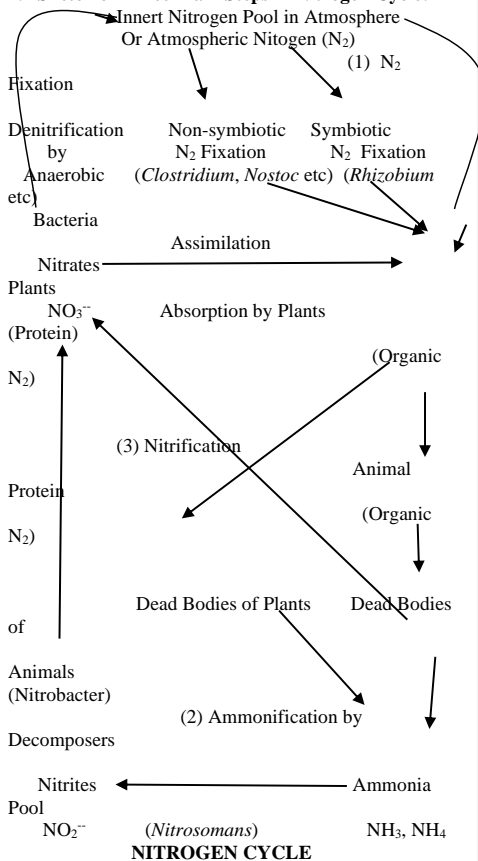
I) From Exercise:-**Questions**

1. What are biogeochemical cycles?

2. Sketch three main steps in the nitrogen cycle.
3. Define grazing.
4. What percentage of sun energy reaches to plants?
5. What is autecology?
6. Define synecology.

Answers**1. Biogeochemical Cycle: -**

1. The circulating pathway of an element through the biotic and abiotic components of an ecosystem is called Biogeochemical cycle.
2. The chemical elements essential for life in living organisms are called biogenic elements or nutrient elements.
3. The cycles of matter are called biogeochemical cycles because they involve biological, geological and chemical interactions.
4. The nutrient cycles are also called biogeochemical cycles as the nutrients move from living to non-living to living portions ecosystem in a cyclic manner.

2. Sketch of Three Main Steps in Nitrogen Cycle: -**3. Grazing: -**

1. The mode of feeding in which animals feed on grass is called grazing.

2. The animal which feed on grass are called grazers. Many animals like rabbits, goat, sheep, cow, buffalo and horses are called grazers because they feed on grass.
3. The tree seedlings which act as competitors for the grass are destroyed by moderate grazing thus it helps to maintain grass land.
4. However, over grazing may lead to transformation of a grass land into a desert.
4. **Percentage of Sun Energy Reaching to Plants:** About 1 % of Sun energy reaches plants.
5. **Autecology: -** They study of relationship of a single population to its environment is called autecology e.g. the studying of the effect of water pollution on 50 to 100 plants of Soyabean on their growth and yield.
6. **Synecology: -**
 1. The study of relationship of different communities or group of populations to their environment is called synecology.
 2. It is also known as community ecology.
 3. In synecology, community and its various aspects like the origin, structure and composition of community are studied.
 4. While studying the community, we come across three levels of integration:
 - i. Individual
 - ii. Population
 - iii. Community

(II) From Punjab Boards:-

LAHORE BOARD QUESTIONS

1. Define synecology. (Lahore Board-2008-A)
2. What are lichens? (Lahore Board-2008-A)
3. Define grazing. (Lahore Board-2008-A)
4. What is a mycorrhiza? (Lahore Board-2009-A)
5. Differentiate between hydrosere and xerosere. (Lahore Board-2009-A)
6. Differentiate between food chain and food web. (Lahore Board-2010-A)
7. What is grazing? How grazers affect the texture of the soil? (Lahore Board-2010-A)
8. Define Niche. (Lahore Board-2011-A)
9. What is a mycorrhiza? (Lahore Board-2011-A)
10. Differentiate between synecology and autecology. (Lahore Board-2011-A)
11. Define biogeochemical cycles. (Lahore Board-Group-I-2012-A)
12. Give the significance of predation.

- (Lahore Board-Group-I-2012-A)
13. Write brief note on secondary succession. (Lahore Board-Group-I-2012-A)
14. Define food chain by giving an example. (Lahore Board-Group-II-2012-A)
15. Differentiate between habitat and niche. (Lahore Board-Group-II-2012-A)
16. Define parasitism. Give its significance. (Lahore Board-Group-II-2012-A)
17. Differentiate between Autecology and synecology. (Lahore Board-Group-I-2013-A)
18. Define commensalism with the help of an example. (Lahore Board-Group-I-2013-A)
19. Define food chain and food web. (Lahore Board-Group-II-2013-A)
20. Explain ecological Niche. (Lahore Board-Group-II-2013-A)
21. Compare population with community. (Lahore Borad-New Scheme-Group-I-2014-A)
22. Define biosphere. (Lahore Borad-New Scheme-Group-I-2014-A)
23. Differentiate between consumers and decomposers. (Lahore Borad-New Scheme-Group-I-2014-A)
24. What is Succession? (Lahore Borad-New Scheme-Group-II-2014-A)
25. Differentiate between biomes and biosphere. (Lahore Borad-New Scheme-Group-II-2014-A)
26. What are producers and consumers? (Lahore Borad-New Scheme-Group-II-2014-A)

Answers

1. **Synecology: -**
See Exercise Answer No: 6
2. **Lichens: -**
Lichens are dual organism composed of symbiotic association of algae living within a fungus mycelium.
The fungus gets food from alga, while alga might get protection by the fungus from intense sunlight and desiccation or the minerals absorbed by the fungus might be transferred to the algae.
3. **Grazing: -**
See Exercise Answer No: 3
4. **Mycorrhiza: -**
 1. It is an association between roots of plants growing in acid soil & certain fungi. The host is pine, heather or beech.

2. It provides the fungus with an enzyme to digest carbohydrate.

In return fungus symbiont • passes mineral ions from soil to host.

5. Differences between Hydrosere and Xerosere: -

Hydrosere	Xerosere
It occurs in open water like ponds, pools or lakes.	It occurs on dry terrestrial places like rocks.

6. Differences between Food Chain and Food Web: -

Food Chain	Food Web
1. A food chain is a sequence of feeding relationships between organisms living within the same community. 2. A food chain represents only one possible route for transfer of food material and energy. In a food chain, an animal has only one option of food to eat.	1. A food web is a network of interconnected food chains. 2. It has a number of feeding connections among different organisms of a community. In a food web, an animal has many options of food to eat.

7. A) Grazing: -

See Exercise Answer No: 3

B) Grazers Affecting the Texture of the Soil: -

Hooves of the grazer temple the soil into hard layer as

a result of which rain water will not penetrate this soil.

It runs off from the upper surface removing the topsoil

with it leading to soil erosion and totally barren land.

8. Niche: -

1. A niche is defined as the ultimate distributional unit within which a species is restrained by the limitations of its physical structure and its physiology.

2. A niche is defined as the role a species plays in a community including behavior and influence.

3. Charles Elton considered the niche, the basic role of an organism in the community – what it does in or living community, its relationship to its food and enemies. In other words, he defined the niche as the species occupation. Thus it refers to a profession or job of an organism.

9. Mycorrhiza: -

See Lahore Board Answer No: 4

10. Differences between Synecology and Autecology: -

See Lahore Board Answer No: 17

11. Biogeochemical Cycles: -

See Exercise Answer No: 1

12. Significance of Predation: -

The sizes of populations predators & prey populations

are related to each other. If the number of prey is large,

then number of predator will increase which will decrease the number of prey as they will become the

food of predator. On the other hand decrease in number

of predator will increase the number of prey. In this

way a cycle of food relationship will form. This food

relationship of predator-prey creates a “cycle”.

13. Brief Note on Secondary Succession: -

1. It is a kind of succession, which occurs in areas where

an existing community has been disturbed but soil still

remains. Or

It is the change in species composition that takes place

after some disturbance removes the existing vegetation; soil is already present at these sites.

2. Secondary succession happens much more rapidly than the primary succession because the previous community has left its mark in the form of improved soil and seeds.

3. Abandoned agriculture fields, or open areas produced

by forest fires are common examples of sites where secondary succession occurs.

14. Food Chain with an Example: -

See Lahore Board Answer No: 19 (A)

15. Differences between Habitat and Niche: -

H a b i t a t	Niche
1. The type of environment in which a particular organism or population lives is its habitat. 2. The habitat is organism's home address.	1. The role (including behavior and influence) which a particular organism or its population plays in a particular habitat is called Niche or Ecological Niche. 2. Niche refers to profession or job of an organism or population.

16. A) Parasitism: -

Parasitism is an association between two living organisms of different species in which one, the parasite gets food and protection from the other known as host. i.e., the parasite is benefited and the host is harmed. Or

It is an association between different organisms of two

different species, in which the smaller species (parasite) lives upon or within the other (host); the

host

is frequently harmed by this relationship.

2. The dependence of parasite on its host is metabolic and involves mutual exchange of substances.

B) Significance of Parasitism: -

1. Parasitism can be a powerful determinant of host

survival & parasite.

2. Sometimes parasites may be pathogenic causing diseases to their hosts which are termed as infestations.

17. Differences between Autecology and Synecology:

Autecology	Synecology
<ol style="list-style-type: none"> 1. It accounts for interrelationship between an individual species and its environment. 2. It is also known as population ecology. 3. In autecology, only one population at the same time is studied. 4. Study of 50 to 100 plants of soya bean only, in order to know the effect of water pollution on their growth and yield is autecology. 	<ol style="list-style-type: none"> 1. It is the study of different communities, their relationship between them and their environment. 2. It is also known as community ecology. 3. In synecology, all the populations (grouping of populations) are studied at the same time. 4. Study of various aspects of community like the origin, structure and composition of the community is synecology.

18. A) Commensalism: -

In commensalism, only one organism benefits from the relationship while the other is, not affected at all.

B) Example: -

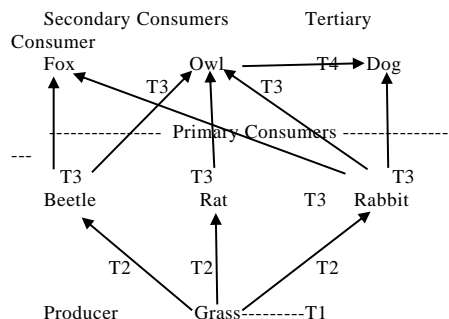
The remoras attached to the shark is an example of commensalism. As the shark feeds, remoras pick up the scraps. The remoras benefit from this relationship, the shark is not affected at all.

19. A) Food Chain: -

1. The transfer of food energy from the source in plants through the series of steps of eating and being eaten of the organisms is called food chain.
2. Basically all animals depend on plants for their food, hence a food chain begins with a green plant (producer) and may consist of three to five links or trophic levels.
3. A short food chain of two or three links supports a community more efficiently than a long chain of five links where much of energy from producers would never reach these organisms at higher trophic levels.
3. Eagle may eat blue bird, but blue bird eats insects like caterpillar and caterpillar feed on grass or green leaves. This is an example of a simple food chain

B) Food Web: -

1. Food web is actually "the combination of many food chains".
2. Food web is not really simple and straight forward, because most animals eat more than one type of food at different times as fox does not feed entirely on rabbit. It also eats beetles, rats etc.
3. Like food chain, food web begins with a green plant (producer) and may consist of three to five links or trophic levels. However, more complex trophic levels or food links are found in a food web.
4. The variety of pathways in a food web helps to maintain the stability of the ecosystem.
5. A food web and various trophic levels are shown in the following chart.

**20. Ecological Niche: -**

1. It refers to a profession or job of an organism.
2. Ecosystems are composed of organisms with different jobs or ways of life, particularly concerned with feeding, the role of a particular species within an ecosystem, including all aspects of interacting with the living and non-living environment.
3. Ecological niche with habitat also specifies how the organism gets its supply of energy and materials.
4. In addition niche includes all the physical factors of the environment necessary for survival, such as range of temperature, amount of humidity, the pH of the water and soil.

21. Comparison of Population with Community: -

Population	Community
<ol style="list-style-type: none"> 1. Population is a group of same kind of organisms living together in the same habitat at the same time. 2. It accounts inter-breeding individuals of same species. 3. Populations exhibit some distinctive characteristics such as population density, population pressure, growth rates, age distribution etc. <p>Examples: - The frogs in a pond make up the frog population. Rohu (fish) in the same make up the Rohu population and the Hydrilla plants there make up the Hydrilla population.</p>	<ol style="list-style-type: none"> 1. Community is a group of many different kinds of organisms living together in the same habitat at the same time. 2. It accounts different species of organisms forming different populations. 3. Communities exhibit some characteristic properties that populations lack, such as number and types of species present, relative abundance of each species, the interactions among different species etc. <p>Example: - A fresh water pond includes the population of Hydrilla, a population of frogs, insects, worms, Rohu and many other kinds of animals. Populations of all these organisms, sharing same</p>

	habitat, constitute the community of that pond.
--	---

22. Biosphere: -

1. Biosphere is a thin layer of earth in which living organisms exist. Or
Biosphere is a thin shell of air, land and water that supports life.
2. Biosphere is spread out over the surface of plant earth extending about 8/10 kilometers in the upper reaches of atmosphere and also in same distance into the depths of ocean.
3. Organisms within the biosphere not only adapt themselves to the environment but also interact to modify and control chemical and physical conditions of the biosphere.

23. Differences between Consumers and Decomposers:

Consumers	Decomposers
They are mainly the animals including man which directly or indirectly depends on the producers.	They are mainly the fungi and bacteria which obtain energy from dead and decaying plants and animals.

24. Succession: -

1. Succession is a sequence in the community structure of an ecosystem over a period of time.
2. Community changes alter the ecosystem in ways that favors competitors and species replace their predecessors in somewhat predictable manner until a stable self sustaining climax community is reached.
3. Succession is a kind of community relay in which assemblages of plants and animals replace the earlier ones in a sequence that is atleast somewhat predictable.
4. Succession is always initiated by a few hard invaders called pioneers and it ends with a diverse and relatively stable climax community.
5. Ecological succession may increase the species richness of communities.
6. There are two kinds of succession:
 - a. Primary succession
 - b. Secondary succession

25. Differences between Biomes and Biosphere: -

Biomes	Biosphere
<ol style="list-style-type: none"> 1. Biomes are large, relatively distinct terrestrial regions of biosphere. 2. A biome is a large regional land ecosystem characterized in particular by certain climatic conditions and particular types of plants. <p>Examples: - Grasslands, deserts, tropical rain forests, tundra etc.</p>	<ol style="list-style-type: none"> 1. Biosphere is the zone of air, land, and water at the surface of the earth in which living organisms are found. 2. The entire biosphere is an ecosystem, a place where organisms interact among themselves and with the physical and chemical environment. <p>Example: - Earth</p>

26. A) Producers: -

1. Producers are the green photosynthetic plants, which capture and bring light energy into the ecosystem.
2. They are able to manufacture organic food from simpler inorganic substances.
3. They are autotrophs.

B) Consumers: -

1. Consumers are all the organisms, primarily animals.
2. They obtain energy directly or indirectly from the producers as ready-made organic food.
3. They are mainly heterotrophic organisms.

GUJRANWALA BOARD QUESTIONS

1. Define a habitat. (Gujranwala Board-2008-A)
2. What is food chain and food web? (Gujranwala Board-2008-A)
3. Define autecology. (Gujranwala Board-2009-A)
4. What is food chain and food web? (Gujranwala Board-2009-A)
5. Differentiate between food chain and food web. (Gujranwala Board-2010-A)
6. Write the significance of root nodules in plants. (Gujranwala Board-2010-A)
7. Define food web. (Gujranwala Board-2011-A)
8. What is biosphere? (Gujranwala Board-2011-A)
9. Distinguish between hydrosere and xerosere. (Gujranwala Board-2011-A)
10. Define autecology with the help of an example. (Gujranwala Board-2012-A)
11. What are lichens and mycorrhizae? (Gujranwala Board-2012-A)
12. Write about decomposers. (Gujranwala Board-2012-A)
13. Define xerosere. Give flow chart of its stages. (Gujranwala Board-New Scheme-2014-A)
14. Define food chain and food web. (Gujranwala Board-New Scheme-2014-A)
15. How nitrogen depletion from soil is being overcome in nature? (Gujranwala Board-New Scheme-2014-A)
16. Differentiate between ectoparasites and endoparasites. (Gujranwala Board-New Scheme-2015-A)
17. What is symbiosis? Give one example. (Gujranwala Board-New Scheme-2015-A)
18. What are lichens? Give one example.

(Gujranwala Board-New Scheme-2015-

A)

Answers**1. Habitat: -**

The actual location of place where an organism lives

is called habitat.

Or

Habitat is a specific locality with particular set of environmental conditions where organisms live. e.g. Earth.

Or

1. A habitat is a specific locality with particular set of environmental conditions where organisms live.

2. It may be on land in water or in the air.

3. Habitat may be as large as the ocean or small as the under-side of a rotten log of a tree or the in the intestine of the termite.

4. The habitat is an organism's home address.

5. Habitat is a place that must meet all the needs of an organism. It provides an organism with food shelter, and a suitable environment to reproduce. An

organism

responds to a variety of these environmental factors, and only when all of them are within the range of tolerance it can inhabit a location.

6. More than one animals or plants may live in a particular habitat.

Examples: -

a. The habitat of squirrel is on the trees.

b. Habitat of frog is the damp shady places near water bodies.

2. Food Chain and Food Web: -

See Lahore Board Answer No: 19

3. Autecology: -

1. It is the branch of biology that deals with the members

of a particular species that are found in an area.

2. It is based on study of individual species and accounts

for interrelationships between an individual species and its environment.

3. As population is the group consisting of same species

that live together in a prescribed area at the same

time

hence this branch of biology is also called

population

ecology.

4. Autecology ecology considers both the number of individuals of a particular species that are found in

an

area and the study of changes in populations.

5. It might study a population of microorganisms, animals, or plants.

Examples: -

a. Study of 50 to 100 plants of soya bean only, in order to know the effect of water pollution on their growth and yield is autecology.

b. Study of single Mango tree in a garden is autecology

in

nature. The study of chemical pollution on the

growth

and the yield of 100 mango plants is also

autecology.

4. A) Food Chain: -

1. The transfer of food energy from the source in plants through a series of organisms with repeated stages of eating and being eaten is known as food chain.

2. Producers form the beginning of the food chain by capturing the sun's energy through photosynthesis. It is eaten by a primary consumer (herbivores), which is preyed upon by a secondary consumer (carnivores and omnivores). The secondary consumer may be eaten by a tertiary consumer. At every step, decomposers (seprobes) break down organic

molecules

in the ramins of all members of food chain. A food chain, can therefore, be represented as:

Producer → Primary Consumer

Secondary

Consumer → Tertiary Consumer

Decomposer

4. A food chain represents only one possible route of transfer of food material and energy.

5. Simple food chains rarely occur in nature, because few

organisms eat just one kind, or are eaten by just one other kind of organism. Such short and simple food chains could be found in simplified ecosystems like

the

tundra.

Examples: -

a. Grass → Cow → Man

b. Grass → Mole → Fox

Bacteria

c. Grass or Green Leaves → Caterpillar

Blue

Bird → Eagle

B) Food Web: -

1. A food web is a network of interconnected food chains.

2. Although simple linear food chains can be found in simple ecosystems, actually food relationships are frequently more complicated in nature. In nature

there

are many alternative sources of food for the herbivores

and the herbivores in turn may be preyed by several

different predators. Consequently linear food chains

interconnect to form food webs. Thus Food web is

actually "the combination of many food chains".

3. A food web is a more realistic model of the flow

of

energy and materials through ecosystems because

it

has a number of feeding connccetions amongst

different organisms of a community. In a food

web,

an animal has many options of food to eat. For

example, fox does not feed entirely on rabbit. It also

eats beetles, rats etc.

4. A food web links together the different

populations

of a community.

5. Food webs are divided into trophic levels.

Producers occupy the first trophic level, primary

consumers (herbivores) occupy the second,

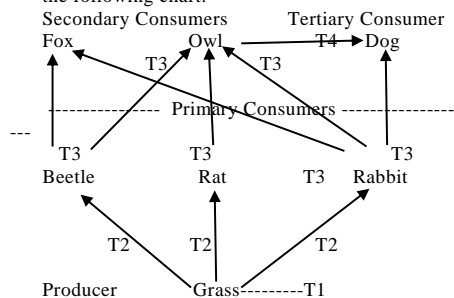
secondary consumers (carnivores and omnivores) the third and so on.

6. The variety of pathways in a food web helps to maintain the stability of the ecosystem.

Examples: -

1. A food web and various trophic levels are shown in

the following chart.



5. **Differences between Food Chain and Food Web:**

- See Lahore Board Answer No: 6

6. **Significance of Root Nodules in Plants: -**
The legume plants, pea and bean are the hosts of symbiotic bacteria. These bacteria inhabit the roots of these plants and form root nodules. The root nodules bacteria fix nitrogen in soil air. They convert this nitrogen into amino acid. They convert this nitrogen into amino acid. These amino acids are used by the host. In return, host provides bacteria with food and protection.

7. **Food Web: -**
See Gujranwala Board Answer No: 4 (B)
8. **Biosphere: -**
See Lahore Board Answer No: 22
9. **Differences Between Hydrosere and Xerosere: -**
See Lahore Board Answer No: 5
10. **Autecology with an Example: -**
See Exercise Answer No: 5

11. **A) Lichens: -**
Lichens are dual organism composed of symbiotic association of algae living within a fungus mycelium.

The fungus gets food from alga, while alga might get protection by the fungus from intense sunlight and desiccation or the minerals absorbed by the fungus might be transferred to the algae..

- B) Mycorrhizae: -**
See Lahore Board Answer No: 4

12. **Decomposers: -**
- Decomposers obtain energy from the dead and decaying plants and animals.
 - They release chemical elements as ions. The main chemical ions are nitrates, ammonia, phosphates, potassium and calcium.
 - They are mainly the fungi and animals.

13. **A) Xerosere**
The primary succession occurring on a xeric or dry

habitat (soil) is termed as xerosere.

Or

It is a succession which occurs on dry habitat.

- B) Flow Chart of Stages of Xerosere: -**
- ```

Crustose Lichen Stag → Foilage Lichen
Stage → Moss Stage → Herbaceous
Stage → Shrub Stage → Climax

```

Forest

Stage

14. **Food Chain and Food Web: -**

See Lahore Board Answer No: 19

15. **Overcoming of Nitrogen Depletion from Soil in Nature: -**

- Nitrogen fixing bacteria which incorporate gaseous nitrogen from air into organic compound.
- Nitrogen fertilizers are added by the man.

16. **Differences Between Ectoparasites and Endoparasites: -**

See Multan Board Answer No: 4

17. **A) Symbiosis: -**

Symbiotic is an association between two organisms, which brings benefit to both the organisms.

- B) One Example of Symbiosis: -**

The legume plants are the hosts to symbiont bacteria, which inhabit the roots forming root nodules. The bacteria in the root nodules fix nitrogen in the soil from air, converting it into amino acid, which the host uses.

In turn, host provides bacteria with food and protection. **Or**

- A) Symbiosis: -**

- Symbiosis is an association between the two organisms of the different species, which start living together. They are mutually benefited or at least one gets benefit but the other is neither benefited nor harmed.
- This symbiotic relationship is of two types:
  - Mutualism** --- The relationship in which both organisms get benefit from each other
  - Commensalism** --- The relationship in which one of the organism gets benefit whereas the other is neither benefited nor harmed.

- B) One Example of Symbiosis: -**

Mycorrhiza is a symbiotic association (Mutualism) between the roots of a plants growing in acid soil and certain fungi. The host is pine, beech or heather and it provides the fungus with an enzyme to digest carbohydrate in leaf litter. In turn, the fungus symbiont passes mineral ions from the soil to the host.

18. **A) Lichens: -**

- Lichens are dual organisms composed of symbiotic association of an alga living within a fungus mycelium.
- Lichens are an example of mutualism between a fungus and alga.
- Lichens grown on exposed rock surfaces and are important colonizers of bare ground.

**B) One Example of Lichen: -**

Crustose lichens are special types of lichens that get impregnated in the form of crust on bare rocks that do not possess moisture and organic matter. One example of crustose lichens is *Rhiza*.

**MULTAN BOARD QUESTIONS**

1. Differentiate between Community and Biome. (Multan Board-2008-A)
2. Explain commensalism with the help of an example. (Multan Board-2008-A)
3. How are the sizes of predators and prey populations related to each other? (Multan Board-2008-A)
4. Differentiate between Ectoparasites and Endoparasites. (Multan Board-2008-S)
5. Differentiate between Macronutrients and Micronutrients. (Multan Board-2008-S)
6. How the sizes of predators and prey populations are related to each others? (Multan Board-2009-A)
7. What is Commensalism? Give an example. (Multan Board-2009-A)
8. What are the effects of overgrazing on soil? (Multan Board-2009-A)
9. Draw a sketch of Trophic Levels. (Multan Board-2009-S)
10. Differentiate between Habitat and Niche. (Multan Board-2009-S)
11. Define Succession. (Multan Board-2009-S)
12. How Synecology is different from Autecology? (Multan Board-2010-A)
13. Differentiate between Overgrazing and Moderate Grazing. (Multan Board-2010-A)
14. Define biogeochemical cycle. (Multan Board-2010-S)
15. Differentiate between food chain and food web. (Multan Board-2010-S)
16. Sketch an energy pyramid. (Multan Board-2011-A)
17. What is infestation? (Multan Board-2011-A)
18. Explain Niche. (Multan Board-2011-A)
19. Differentiate between Pioneers and Climax Community:- (Multan Board-2011-S)
20. What is Parasitism? (Multan Board-2011-S)
21. Define food chain and food web only.

- (Multan Board-2011-S)
22. What are Root Nodules? Give their importance. (Multan Board-2012-A)
23. Differentiate Between Food Chain and Food web. (Multan Board-2012-A)
24. What is Mycorrhiza? (Multan Board-2012-A)
25. What is nutrient cycle? How is the balance in nutrient cycle upset? (Multan Board-2012-S)
26. Differentiate Autecology and Synecology. (Multan Board-2012-S)
27. What is ecological niche? How does it differ from habitat? (Multan Board-2012-S)
28. Compare population and community. Give examples. (Multan Board-2012-S)
29. What is Autecology? (Multan Board-2013-A)
30. Define Grazing. (Multan Board-2013-A)
31. Differentiate between Ectoparasites and Endoparasites. (Multan Board-Old Scheme-2014-A)
32. What is Commensalism? Give one example. (Multan Board-Old Scheme-2014-A)
33. Differentiate between Mutualism and Commensalism. (Multan Board-Old Scheme-2014-A)
34. What is Predation? Give its significance. (Multan Board-Old Scheme-2014-A)
35. Define Food Chain and Food Web. (Multan Board-New Scheme-2014-A)
36. Differentiate between Autecology and Synecology. (Multan Board-New Scheme-2014-A)
37. Differentiate between Population and Community. (Multan Board-New Scheme-2014-A)
38. Define grazing. (Multan Board-New Scheme-2015-A)
39. What are decomposers? (Multan Board-New Scheme-2015-A)
40. Differentiate between Primary and Secondary Succession. (Multan Board-New Scheme-2015-A)

**Answers****1. Differences between Community and Biome: -**

| Community           | Biome          |
|---------------------|----------------|
| It is the naturally | It is regional |

occurring group of different species of organisms living together in a certain environment and interacting with one another and with their physical environment.

ecosystem extending over a large natural area is known as biome. The examples are grasslands, deserts, trophic rain forests and tundra etc

## 2. Commensalism with Example: -

See Lahore Board Answer No: 18

## 3. Sizes of Predators and Prey Populations Related to

### Each Other: -

The sizes of populations predators & prey populations are related to each other. If the number of prey is large,

then number of predator will increase which will decrease the number of prey as they will become the food of predator. On the other hand decrease in number

of predator will increase the number of prey. In this

way a cycle of food relationship will form. This food

relationship of predator-prey creates a "cycle".

## 4. Differences between Ectoasites and Endoparasites: -

| Ectoparasites                                                   | Endoparasites                                                                                                         |
|-----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| 1. These parasites live on or in the outer surface of its host. | 1. These are the parasites that live within their hosts.                                                              |
| 2. Ticks, mites, lice are examples.                             | 2. <i>Taenia</i> (tape worm) living in the intestine of man, and <i>Plasmodium</i> living in the blood, are examples. |

## 5. Differences between Macronutrients and Micronutrients: -

| Micronutrients                                                      | Macronutrients                                                                        |
|---------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| The nutrients required in small quantity are called micronutrients. | The nutrient elements which are required in large quantity are called macronutrients. |
| <b>Examples: -</b><br>Zinc, Iodine, Iron                            | <b>Examples: -</b><br>Carbon Hydrogen, Oxygen, Nitrogen                               |

## 6. Sizes of Predators and Prey Populations Related to

### each Other: -

The predator is commonly believed to regulate population density of its prey. Actually the relation

is somewhat balanced. If a prey population increases,

it will support more predation as a result the

population of predator also increases. If the prey is killed in

large numbers, then its population size will be reduced.

As a result the density of the predators will be slightly out

of place with regard to the number of prey. Such

fluctuation may occur in wild population.

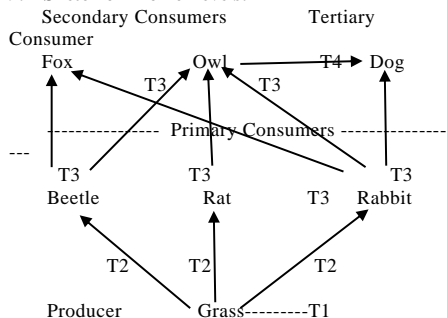
## 7. A) Commensalism: -

See Lahore Board Answer No: 18

## 8. Effects of Overgrazing on Soil: -

If too many animals are kept in pasture, they eat grasses down to the root. The grasses are more resistant than herbaceous plants. They have ability to regrow very fast. But the hooves of grazing animals trample the soil. It changes the soil into hard layer.

## 9. Sketch of Trophic Levels: -



## 10. Differences between Habitat and Niche: -

See Lahore Board Answer No: 15

## 11. Succession: -

It can be defined as the change in community structure and its non-living environment over a

period of time. Or

Succession is the slow, orderly progression of changes in community composition that takes place through times. Or

It is the sequence of changes in the species composition of a community over time.

## 12. Synecology Different from Autecology: -

See Lahore Board Answer No: 17

## 13. Differences between Overgrazing and Moderate Grazing: -

| Over Grazing                                                                                                                                   | Moderate Grazing                                                                                                                   |
|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Too much animals on pasture land eat the grass down to the root and hooves of animals trample the soil into hard layer leading to barren land. | Moderate grazing destroys the competitor weeds and helps the grass to grow well and is helpful in maintaining grassland ecosystem. |

## 14. Biogeochemical Cycle: -

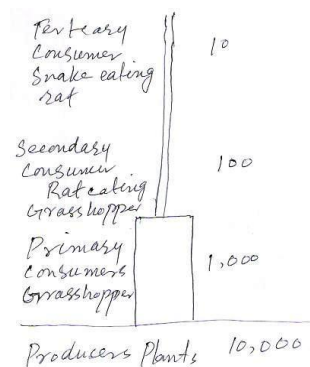
See Exercise Answer No: 1

## 15. Differences between Food Chain and Food Web: -

See Lahore Board Answer No: 6

## 16. Sketch of an Energy Pyramid: -



**17. Infestation: -**

Diseases in living organisms which are caused by parasites are called infestations

**18. Niche: -**

Within a particular habitat, organisms of different species have their own ways of life and food relationships with other organisms. This means that each organism has a functional position different from

other organisms of the habitat. Thus an organism or its

population's role in a particular habitat, its activities, requirements, and its effects are collectively called ecological niche.

**19. Differences between Pioneers and Climax Community:-**

| Pioneer Community                                                      | Climax Community                                                                  |
|------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| 1. Succession begins by a few hardy invaders called pioneer community. | 1. At the end of succession the diverse and stable community is climax community. |
| 2. Crustose lichens in xerosere is an example pioneer community.       | 2. Trees or forest at the end of xerosere is an example of climax community.      |

**20. Parasitism: -**

1. Parasitism is an association between two living organisms of different species in which one, the parasite gets food and protection from the other known as host. i.e., the parasite is benefited and the host is harmed. Or

It is an association between different organisms of two different species, in which the smaller species (parasite) lives upon or within the other (host); the host is frequently harmed by this relationship.

2. The dependence of parasite on its host is metabolic and involves mutual exchange of substances.
3. Sometimes parasites may be pathogenic causing diseases to their hosts.
4. The diseases in living organisms which are caused by parasites are called infestations.
5. Parasitism can be a powerful determinant of host survival & parasite.
6. Parasites may be ectoparasites, living outside the body of host and are called ectoparasites while

some parasites live inside the body of the host and are called endoparasites.

**7. Examples: -**

- a. Fungi, lice, ticks mites are some examples of ectoparasites
- b. Tape worm in the intestine of man, *Plasmodium*, *Entamoeba histolytica* are some examples of endoparasites.

**21. Food Chain and Food Web: -**

See Lahore Board Answer No: 19

**22. A) Root Nodules: -**

Some nitrogen fixing bacteria (*Rhizobium*) live in the

roots of leguminous plants. E.g. peas, soyabean etc. These bacteria produce some swellings in the roots called nodules. Or

The legume plants, Pea and bean are the hosts to symbiotic bacteria (*Rhizobium*), which inhabit the outgrowths on roots called root nodules.

**B) Importance of Root Nodules: -**

The root nodule bacteria fix nitrogen, converting it into

amino acids, which the host uses. In return, host provides bacteria with food and protection. Or

The bacteria within nodules serve to fix atmospheric nitrogen in the form of nitrogenous compounds. These compounds used by the host

plants in making the proteins and other compounds.

**23. Differences Between Food Chain and Food Web: -**

See Lahore Board Answer No: 6

**24. Mycorrhiza: -**

See Lahore Board Answer No: 4

**25. A) Nutrient Cycle: -**

1. Matter moves in numerous cycles from one part of an

ecosystem to another—that is from one organism to another and from living organisms to the abiotic environment and back again. This is called nutrient cycle.

2. The nutrient cycles are also called biogeochemical cycles as the nutrients move from living to non-

living to living portions ecosystem in a cyclic manner.

**B) Upset of Balance in Nutrient Cycle: -**

Nitrogen is balanced through:

1. Nitrogen fixing bacteria which incorporate gaseous nitrogen from air into organic compound.
2. Nitrogen fertilizers added by the man.

**26. Differences between Autecology and Synecology: -**

See Lahore Answer No: 17

**27. A) Ecological Niche: -**

Niche is defined as the ultimate distributional unit with in which a species is restrained by the limitations

of its physical species is restrained by the limitations of

physical structure and its physiology

**B) Ecological Niche Different from Habitat: -**

See Lahore Board Answer No: 15

**28. Comparison of Population and Community: -**

See Lahore Board Answer No: 21

**29. Autecology: -**

See Exercise Answer No: 5

**30. Grazing: -**

See Exercise Answer No: 3

**31. Differences between Ectoparasites and Endoparasites: -**

See Multan Board Answer No: 4

**32. Commensalism with Example: -**

See Lahore Board Answer No: 18

**33. Differences between Mutualism and Commensalism: -**

| Mutualism                                                                                                                    | Commensalism                                                                                                                                                                           |
|------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. In this association both organisms are benefited.<br>2. Lichens are an example of mutualism between a fungus and an alga. | 1. In this association only one organism is benefited while the other is neither harmed nor benefited.<br>2. Remoras (small fishes) attached to sharks are an example of commensalism. |

**34. A) Predation: -**

1. An animal that preys other animals is a Predator.  
The animal that is caught & eaten is prey. This whole process is known as Predation. Or  
Predation is an interaction between two animals of different species or between a plant and an animal.

In predation, one organism (the predator) attacks, kills, and feeds on other organism (the prey). Or  
Predation is the consuming of one organism by other.

2. All carnivores are predators.

**Examples: -**

- Frog preys upon mosquito.
- Fox preys upon rabbit.
- Cat preys upon mouse.
- Seal preys upon fish.
- Hawk preys upon small birds.

**B) Significance of Predation: -**

- Predator-prey relationship has an important bearing on the distribution and abundance of organism.
- Predation keeps the prey population in check, so as to maintain an ecological balance.
- The prey-predator relationship is an important factor that influences population size. The sizes of population of predator and prey are related to each other. The size of each population is determined by the size of the other. One population increases, the other decreases and vice versa.
- Predation provides strong selective pressures on prey populations. Any feature that would decrease the probability of capture should be strongly favored. In turn, the evolution of such features causes natural selection to favor counteradaptations in predator populations. In this way, a coevolutionary arms race may cause in which predators and prey are constantly evolving better means of circumventing these defenses.

**35. Food Chain and Food Web: -**

See Lahore Board Answer No: 19

**36. Differences between Autecology and Synecology: -**

See Lahore Board Answer No: 17

**37. Differences between Population and Community: -**

See Lahore Board Answer No: 21

**38. Grazing: -**

See Exercise Chapter No: 25 Answer No: 3

**39. Decomposers: -**

Decomposers are the organisms that feed dead and decaying organisms and drive energy by breaking them down into simpler substances releasing chemical elements as ions. Or

Decomposers are the microbial heterotrophs that break down dead organic material and use the decomposition products as a source of energy. Or

Decomposers are the saprobes that break down Organic matter accumulated in the bodies of other organisms.

- They are also called saprotrophs or saprobes.
- Many types of bacteria and fungi are principal decomposers of biosphere.
- They decompose organic media and utilize some of them as a source of energy, while rest is released in environment as ions that are made available for consumption of producers.
- Temperature influences the rate of decomposition, as the rate of break down is rapid in summers than in winter.

**40. Differences between Primary and Secondary Succession: -**

See Faisalabad Board Answer No: 6

**BAHAWALPUR BOARD QUESTIONS**

- Define Commensalism. (Bahawalpur Board-2008-A)
- What are biogeochemical cycles? (Bahawalpur Board-2008-A)
- Differentiate between Hydrosere and Xerosere (Bahawalpur Board-2009-A)
- Define the term Biogeochemical Cycle. (Bahawalpur Board-2009-A)
- What is Synecology? (Bahawalpur Board-2010-A)
- Differentiate between Predator and Prey. (Bahawalpur Board-2010-A)
- Define Foliose Lichens with one example. (Bahawalpur Board-2011-A)
- Differentiate between Predator and Prey. (Bahawalpur Board-2011-A)
- Differentiate between Autecology and Synecology.

- (Bahawalpur Board-2011-  
A)  
10. Differentiate between Synecology and Autecology.  
(Bahawalpur Board-2012-  
A)  
11. Define Biosphere. (Bahawalpur Board-2012-  
A)  
12. Define Predation. What is its significance.  
(Bahawalpur Board-2012-  
A)  
13. What is Climax Community?  
(Bahawalpur Board-2013-  
A)  
14. What is Mycorrhiza? Give an example.  
(Bahawalpur Board-2013-  
A)  
15. Define Mutualism and give atleast one example.  
(Bahawalpur Board-New Scheme-2014-  
A)  
16. Differentiate between Autecology and Synecology.  
(Bahawalpur Board-New Scheme-2014-  
A)  
17. Define Parasitism and give atleast one example.  
(Bahawalpur Board-New Scheme-2014-  
A)  
18. Define Hydrosere and Xerosere.  
(Bahawalpur Board-New Scheme-2015-  
A)  
19. Differentiate between Population and Community.  
(Bahawalpur Board-New Scheme-2015-  
A)  
20. Differentiate between Autecology and Synecology.  
(Bahawalpur Board-New Scheme-2015-  
A)

### Answers

1. **Commensalism:** -  
See Lahore Board Answer No: 18  
2. **Biogeochemical Cycles:** -  
1. Biogeochemical cycles are cyclic pathways through which materials move from environment to organisms and back to environment. Or  
The back and forth movements of chemical elements between organisms and environment along characteristic circular paths are known as  
2. Environment is a source of materials called nutrients for all living organisms. These nutrients are used by the plants in their growth which in turn form food for the heterotrophic organisms. The dead bodies of plants and heterotrophic organisms are decomposed by microorganisms releasing materials called nutrients back into the environment. Thus the materials are continuously recycled between organisms and environment and this is called Biogeochemical cycle.  
3. Since such movement of elements and inorganic compounds is essential for maintenance of life, they are also called nutrient cycles.  
4. Carbon, hydrogen, oxygen and nitrogen are present in

- almost all compounds involved in metabolic activities, hence they are essential for maintenance of life.  
5. The carbon, hydrogen and oxygen are closely related to one another and form carbon hydrogen and oxygen cycle, while phosphorus and nitrogen form independent cycles.  
3. **Differentiate between Hydrosere and Xerosere:** -  
See Lahore Board Answer No: 5  
4. **Biogeochemical Cycle:** -  
See Bahawalpur Board Answer No: 2  
5. **Synecology:** -  
See Exercise Answer No: 6  
6. **Differences between Predator and Prey:** -  
An animal that preys other animals is a Predator.  
The animal that is caught & eaten is prey.  
7. **A) Foliage Lichens:** -  
At this stage the lichens gradually break the surface of the rock which become rough with more and more fissures and depressions. In this stage the lichens are just crumpled leaves attached at one point. It provides shade to the crustose lichen as a result their growth is reduced  
**B) Example:** -  
*Dermatocarpon, Parmellia* etc.  
8. **Differences between Predator and Prey:** -  
See Bahawalpur board Answer No : 6  
9. **Differences between Autecology and Synecology:** -  
See Lahore Board Answer No: 17  
10. **Differences between Synecology and Autecology:** -  
See Lahore Board Answer No: 17  
11. **Biosphere:** -  
The earth, its atmosphere and depths of oceans which are inhabited by the living organisms are collectively known as the biosphere. It extends about eight to ten km up into atmosphere and similar distance down in depths of oceans. Or  
Life is supported on the earth within a relatively thin envelope of air, water and soil. No life exists beyond the earth's atmosphere or deep beneath its upper crust.  
This life sustaining envelope of earth is called biosphere.  
12. **Predation and its Significance:** -  
See Multan Board Answer No: 34  
13. **Climax Community:** -  
1. At the end of succession the diverse and stable community is climax community.  
2. Trees are forest at the end of xerosere  
14. **Mycorrhiza with an Example:** -  
See Lahore Board Answer No: 4  
15. **Mutualism with One Example:** -  
It is the relationship between two organisms in which both the organisms benefit from each other. Or

It is the physiological interdependence of two organisms of different species which are mutually beneficial. Or  
Mutualism is a close and permanent relationship between two organisms of different species, from which both derive some benefit.

Example:-

Lichens are an example of mutualism between a fungus and an alga.

#### 16. Differences between Autecology and Synecology:

-

See Lahore Board Answer No: 17

#### 17. Parasitism with One Example: -

Multan Board Answer No: 20

#### 18. A) Hydrosere: -

1. Primary succession starting in water is called hydrosere. Or  
Primary succession in open water like ponds, pools

or

lakes which are ultimately converted to land community constitute hydrosere.

2. Succession actually occurs in plants and animals both.

However, much visible changes can be seen in plants, hence it looks succession of plants.

3. The seral stages of hydrosere in a pond are:

- a. Phytoplankton stage
- b. Submerged stage
- c. Floating stage
- d. Reed swamp stage
- e. Sedge meadow stage
- f. Wood land stage
- g. Climax (tree) stage

#### B) Xerosere: -

1. Primary succession starting on a dry soil or habitat is called xerosere. Or

The succession which occurs on dry terrestrial places

is called Xerosere.

2. Xerosere occurs on a bare rock or land, where there is

lack of water and organic nutrients, though having some minerals.

3. The seral stages of xerosere are as follows:

- a. Pioneer (crustose lichen) stage
- b. Foliage lichen stage
- c. Moss stage
- d. Herbaceous (plant) stage
- e. Shrub stage
- f. Climax (forest) stage

#### 19. Differences between Population and Community:

-

See Lahore Board Answer No: 21

#### 20. Differences between Autecology and Synecology:

-

See Lahore Board Answer No: 17

#### **FAISALABAD BOARD QUESTIONS**

1. What is Mycorrhiza? (Faisalabad Board-2008-A)
2. Define Synecology. (Faisalabad Board-2008-A)
3. Differentiate between food web and food chain.

(Faisalabad Board-2008-

A)

4. Define Grazing? (Faisalabad Board-2008-

A)

5. What are the main steps in a biogeochemical cycle? (Faisalabad Board-2009-

A)

6. Differentiate between primary and secondary succession. (Faisalabad Board-2009-

A)

7. What are root nodules? Give example. (Faisalabad Board-2010-

A)

8. What is biosphere? (Faisalabad Board-2011-

A)

9. Briefly explain food chain. (Faisalabad Board-2011-

A)

10. Sketch three main steps in nitrogen cycle. (Faisalabad Board-2011-

A)

11. How is community differ from population? (Faisalabad Board-2012-

A)

12. Differentiate between hydrosere and xerosere? (Faisalabad Board-2012-

A)

13. What is commensalism? (Faisalabad Board-2012-

A)

14. Define autecology and synecology. (Faisalabad Board-2013-

A)

15. Differentiate between primary and secondary succession. (Faisalabad Board-2013-

A)

16. Differentiate between food chain and food web. (Faisalabad Board-Old Scheme-2014-

A)

17. Define Niche. (Faisalabad Board-Old Scheme-2014-

A)

18. Define Parasitism? Give its significance. (Faisalabad Board-Old Scheme-2014-

A)

19. Define xerosere. Give flow chart of its stages. (Faisalabad Board-New Scheme-2014-

A)

20. Define food chain and food web. (Faisalabad Board-New Scheme-2014-

A)

21. How nitrogen depletion from soil is being overcome in nature? (Faisalabad Board-New Scheme-2014-

A)

22. What is commensalism? (Faisalabad Board-New Scheme-2015-

A)

23. Differentiate between micronutrients and macronutrients. (Faisalabad Board-New Scheme-2015-

A)

#### **Answers**

##### 1. Mycorrhiza: -

See Lahore Board Answer No: 4

##### 2. Synecology: -

See Exercise Answer No: 6

**3. Differences between Food Web and Food Chain: -**

See Lahore Board Answer No: 6

**4. Grazing: -**

See Exercise Answer No: 3

**5. Main Steps in a Biogeochemical Cycle: -**

1. Ammonification
2. Nitrification
3. Assimilation

**6. Differences between Primary and Secondary Succession: -**

| Primary Succession                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Secondary Succession                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"> <li>1. It is the change in species composition over time in a habitat that was not previously inhabited by organisms.</li> <li>2. It occurs in lifeless areas such as, newly deposited lava (area following volcano eruption), newly formed sand dunes or areas developed due to land slides, erosion, glacial retreat etc.</li> <li>3. No soil exists when primary succession begins.</li> <li>4. It is extremely slow process requiring thousands of years to complete.</li> </ol> <p><b>Example: -</b><br/>Primary succession can be seen in part of Indonesian island of Karakaton. In 1883, a volcanic eruption destroyed all life form on this island.</p> | <ol style="list-style-type: none"> <li>1. It is the change in species composition over time in a habitat where existing community has been disturbed.</li> <li>2. It occurs in places which were previously occupied by living things, but were destroyed by fire or any other climatic or biotic change.</li> <li>3. The area where secondary succession begins though looks to be bare devoid of living matter, but its substratum is built up and has soil.</li> <li>4. It is relatively fast process as previous community has left its mark in the form of improved soil and nutrients.</li> </ol> <p><b>Example: -</b><br/>Secondary succession can be seen in Yellowstone National Park of America. One third of this park was burnt by wildfires in 1988.</p> |

**7. Root Nodules with Example: -**

The legume plants, pea and bean are the hosts of symbiont bacteria. These bacteria inhabit the roots of these plants and form root nodules. The root nodules bacteria fix nitrogen in soil air. They convert this nitrogen into amino acid. They convert this nitrogen into amino acid. These amino acids are used by the host. In return, host provides bacteria with food and protection

**8. Biosphere: -**

1. Biosphere is the part of earth in which life exists, (Hutchinson, 1970).
2. The biosphere consists of earth surface or earth crust

(few meters in depth), air capsule (about 8-10 kilometers up into atmosphere) and water (about eight to ten kms down in depths of oceans).

3. All living things live within biosphere and no life exists beyond it.

**9. Food Chain: -**

See Lahore Board Answer No: 19 (A)

**10. Sketch of Three Main Steps in Nitrogen Cycle: -**

See Exercise Answer No: 2

**11. Community Different from Population: -**

See Lahore Board Answer No: 21

**12. Differences between Hydrosere and Xerosere: -**

See Lahore Board Answer No: 5

**13. Commensalism: -**

See Lahore Board Answer No: 18

**14. Autecology and Synecology: -**

See Exercise Answer No: 5 and 6

**15. Differences between Primary and Secondary Succession: -**

See Faisalabad Board Answer No: 6

**16. Differences between Food Chain and Food Web: -**

See Lahore Board Answer No: 19

**17. Niche: -**

See Lahore Board Answer No: 8

**18. Parasitism and its Significance: -**

See Multan Board Answer No: 20

**19. A) Xerosere: -**

In this case, succession occurs on a dry soil or rock.

**B) Flow Chart of Stages of Xerosere: -**

Crustose lichen stage, Foliose lichen stage, moss stage, herbaceous stage, shrub stage, climax/forest stage

**20. Food Chain and Food Web: -**

See Lahore Board Answer No: 19

**21. Overcoming of Nitrogen Depletion from Soil: -**

1. Addition of nitrogenous fertilizers
2. Nitrogen fixation

**22. Commensalism: -**

See Lahore Board Answer No: 18

**23. Differences between Micronutrients and**

**Macronutrients: -**

See Multan Board Answer No: 5

**RAWALPINDI BOARD QUESTIONS**

1. Compare population and Community.  
(Rawalpindi Board-2011-  
A)
2. Define Autecology and Synecology.  
(Rawalpindi Board-2011-  
A)
3. Differentiate between Habitat and Niche  
(Rawalpindi Board-2011-  
A)
4. Define food chain with an example.  
(Rawalpindi Board-2012-  
A)
5. Differentiate between autecology and synecology.  
(Rawalpindi Board-2012-  
A)
6. What are macronutrients? Give at least four examples.  
(Rawalpindi Board-2013-  
A)

7. Give two examples of symbiotic organisms.  
(Rawalpindi Board-2013-

A)

8. Differentiate between ectoparasites and endoparasites.

(Rawalpindi Board-New Pattern-2014-

A)

9. Differentiate between autecology and synecology.  
(Rawalpindi Board-New Pattern-2014-

A)

10. Differentiate between habitat and ecological niche.  
(Rawalpindi Board-New Pattern-2014-

A)

11. Differentiate between a Food chain and a Food web.  
(Rawalpindi Board-New Pattern-2015-

A)

12. What is difference between Biotic and Abiotic components? Give six examples of Abiotic components.

(Rawalpindi Board-New Pattern-2015-

A)

13. Define Niche.

(Rawalpindi Board-New Pattern-2015-

A)

## Answers

1. **Comparison of Population and Community:** -

See Faisalabad Board Answer No: 11

2. **Autecology and Synecology:** -

See Exercise Answer No: 5 and 6

3. **Differences between Habitat and Niche:** -

See Multan Board Answer No: 10

4. **Food Chain with an Example:** -

See Lahore Board Answer No: 19 (A)

5. **Differences between Autecology and Synecology:**

-

See Lahore Board Answer No: 17

6. **A) Macronutrients:** -

The nutrient elements which are required which are in large quantity are called macronutrients.

- B) Four Examples**

Carbon Hydrogen, Oxygen, Nitrogen

7. **Two Examples of Symbiotic Organisms:** -

Rhizobium, Mycorrhiza

8. **Differences between Ectoparasites and Endoparasites:** -

See Multan Board Answer No: 20

9. **Differences between Autecology and Synecology:**

-

See Lahore Board Answer No: 17

10. **Differences between Habitat and Ecological Niche:-**

See Lahore Board Answer No: 15

11. **Differences between a Food Chain and a Food Web:** -

See Lahore Board Answer No: 6

12. **A) Differences between Biotic and Abiotic Components:** -

| Biotic Components                                                                | Abiotic Components                                                                                           |
|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| 1. Living organisms that interact in an ecosystem make up its biotic components. | 1. Abiotic components of an ecosystem are the physical aspects of its surrounding which influence the biotic |
| 2. Biotic components                                                             |                                                                                                              |

include producers, all types of consumers and the decomposers.

components.  
2. Abiotic components include all non-living components air, water, soil etc.

- B) Examples of Abiotic Components: -**

1. Light
2. Temperature
3. Water
4. Atmosphere and wind
5. Fire
6. Soil
7. Topography
8. Gravity
9. Inorganic nutrients

- 13. Niche: -**

See Lahore Board Answer No: 20

## SARGODHA BOARD QUESTIONS

1. Differentiate between population and species.

(Sargodha Board-2010-

A)

2. What is meant by a climax forest?

(Sargodha Board-2010-

A)

3. Compare lichens with mycorrhiza.

(Sargodha Board-2010-

A)

4. Discuss predation and its significance.

(Sargodha Board-2011-

A)

5. Differentiate between mutualism and commensalism.

(Sargodha Board-2011-

A)

6. Discuss the role of decomposers in ecosystem.

(Sargodha Board-2012-

A)

7. State parasitism with examples.

(Sargodha Board-2012-

A)

8. What are Biogeochemical Cycles?

Sargodha Board-2012-

A)

9. Define autecology and community ecology.

(Sargodha Board-2013-

A)

10. Define parasitism. Give its importance.

(Sargodha Board-2013-

A)

11. What are Decomposers?

(Sargodha Board-New Scheme-2014-

A)

12. Differentiate between population and community.

(Sargodha Board-New Scheme-2014-

A)

13. Differentiate between Hydrosere and Xerosere.

(Sargodha Board-New Scheme-2014-

A)

## Answers

1. **Differences between Population and Species: -**

| Population               | Species                 |
|--------------------------|-------------------------|
| Population is a group of | A species is a group of |

|                                                                                   |                                                                                                                                                                                                      |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| members of same species that live together in a prescribed area at the same time. | closely related interbreeding individuals which produce fertile offsprings (and remain reproductively isolated from other living organisms) that live or lived at any part of the earth at any time. |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**2. Climax Forest: -**

Soil is much improved which allows growth of woody plants. The shade of these plants inhibits the growth of most plants other than lichens. Woody plants dominate and are established as a forest. This is climax and stable stage for this region.

**3. Comparison of Lichens with Mycorrhiza: -**

See Multan board Answer No.2

**4. Predation and its Significance: -**

See Multan board Answer No.34

**5. Differences between Mutualism and Commensalism: -**

See Multan Board Answer No: 33

**6. Role of Decomposers in Ecosystem: -**

Decomposers break down complex organic compounds

of dead matter (of plants and animals) into simple compounds. They secrete digestive juices into dead decaying plant and animal remains to digest the organic material. After digestion, decomposers absorb

the products for their own use. The remaining substances are added to the environment as ions (nitrates, ammonia, phosphates, potassium and calcium) that are taken up by the plants. Therefore, the

decomposers play an important role in recycling the materials. Otherwise plants would be completely dependent only on physical processes, such as minerals from rocks.

**7. Parasitism with Examples: -**

See Multan Board Answer No: 20

**8. Biogeochemical Cycles: -**

See Exercise Answer No: 1

**9. A) Autecology: -**

See Exercise Answer No: 5

**B) Community Ecology: -**

See Exercise Answer No: 6

**10. Parasitism and its Importance: -**

See Lahore Board Answer No: 16

**11. Decomposers: -**

See Gujrawala board Answer No.12

**12. Differences between Population and Community: -**

See Faisalabad Board Answer No: 14

**13. Differences between Hydrosere and Xerosere: See**

See Lahore Board Answer No.12

**DERA GHAZI KHAN BOARD QUESTIONS**

1. Differentiate a food chain and a food web.

(D.G.K. Board-2009-

A)

2. What is common and different in lichen and mycorrhiza? (D.G.K. Board-2009-

A)

3. Sketch three main steps in Nitrogen cycle. (D.G.K. Board-2010-

A)

4. Define food chain and food web. (D.G.K. Board-2011-

A)

5. Give the role of Decomposers in an Ecosystem. (D.G.K. Board-2011-

A)

6. Differentiate between Hydrosere and Xerosere. (D.G.K. Board-2011-

A)

7. Give significance of predation. (D.G.K. Board-Group-I-2012-

A)

8. Define ammonification and assimilation. (D.G.K. Board-Group-I-2012-

A)

9. Define mutualism. Give examples. (D.G.K. Board-Group-I-2012-

A)

10. What are biogeochemical cycle? (D.G.K. Board-Group-II-2012-

A)

11. Write down briefly about root nodules. (D.G.K. Board-Group-II-2012-

A)

12. Define Biosphere. (D.G.K. Board-Group-II-2012-

A)

13. Differentiate between food chain and food web. (D.G.K. Board-Group-I-2013-

A)

14. What is mutualism? Give its examples. (D.G.K. Board-Group-I-2013-

A)

15. Define succession. Give its types. (D.G.K. Board-Group-II-2013-

A)

16. Differentiate between macronutrients and micronutrients. (D.G.K. Board-Group-II-2013-

A)

17. What are lichens? (D.G.K. Board-New Scheme-Group-I-2014-

A)

18. Give two definitions of Niche. (D.G.K. Board-New Scheme-Group-I-2014-

A)

19. Define Autecology with the help of an example. (D.G.K. Board-New Scheme-Group-I-2014-

A)

20. Define Humus. (D.G.K. Board-New Scheme-Group-II-2014-

A)

21. Differentiate between Nitrification and Denitrification. (G.K. Board-New Scheme-Group-II-2014-

A)

22. What do you know about commensalism.

- (D.G.K. Board-New Scheme-Group-I-2015-  
A)  
23. Differentiate between pioneers and climax community.  
(D.G.K. Board-New Scheme-Group-I-2015-  
A)  
24. What is meant by Biogeochemical Cycle?  
(D.G.K. Board-New Scheme-Group-II-2015-  
A)  
25. What is Assimilation?  
(D.G.K. Board-New Scheme-Group-II-2015-  
A)  
26. Differentiate between Synecology and Autecology.  
(D.G.K. Board-New Scheme-Group-II-2015-  
A)

### Answers

- Differences between Food Chain and Food Web:** -  
See Lahore Board Answer No: 19
- A) Common in Lichen and Mycorrhiza:** -  
Both have mutualism. It is a type of symbiotic relationship in which both species get benefit.
- B) Difference between Lichen and Mycorrhiza:** -  
Lichen is a dual organism composed of an alga living within Fungus mycelium. Mycorrhiza is an association between roots of plants growing in acidic soil & certain fungi.
- Sketch of Three Main Steps in Nitrogen Cycle:**  
See Exercise Answer No: 2
- Food Chain and Food Web:** -  
See Lahore Board Answer No: 19
- Role of Decomposers in an Ecosystem:** -  
See Gujrawala Board Answer No: 19
- Differences between Hydrosere and Xerosere:**  
See Lahore Board Answer No: 5
- Significance of Predation:** -  
See Multan Board Answer No: 34
- A) Ammonification:** -  
The release of ammonia by the breakdown of amino acids and nucleic acids by microbes like fungi and bacteria is called ammonification. Or  
It is the conversion of nitrogen-containing organic compounds to ammonia by certain soil bacteria (ammonifying bacteria). It is a part of nitrogen cycle.
- B) Assimilation:** -  
The highly soluble nitrates are dissolved in the soil water and are taken up by the roots of the plants. The absorption and utilization of ammonia or nitrates by plants is called assimilation. Or  
In assimilation roots absorb ammonia, ammonium or nitrate that nitrogen fixation and nitrification formed and incorporate the nitrogen into proteins, nucleic acids, and chlorophyll. When animals consume plant tissues they assimilate nitrogen by taking in plant nitrogen compounds and converting them to animal nitrogen compounds.
- Mutualism with Examples:** -  
See Bahawalpur Board Answer No: 45
- Biogeochemical Cycle:** -  
See Exercise Chapter No: 25 Answer No: 1
- Root Nodules:** -  
See Multan Board Answer No: 22
- Biosphere:** -

Biosphere is the zone of air, land, and water at the surface of earth in which living organisms are found.  
Or

Biosphere is that part of the atmosphere, hydrosphere, and lithosphere that contains living things.

**13. Differences between Food Chain and Food Web:** -  
See Lahore Board Answer No: 34

**14. Mutualism with Examples:** -  
See Bahawalpur Board Answer No: 15

**15. A) Succession:** -  
It can be defined as the change in community structure and its non-living environment over a period of time.

**B) Types of Succession:** -  
There are two major forms of succession. (i) Primary succession. (ii) Secondary

**16. Differences between Macronutrients and Micronutrients:** -  
See Multan Board Answer No: 5

**17. Lichens:** -  
See Lahore Board Answer No: 2

**18. Two Definitions of Niche:** -  
1. A niche is defined as the role a species plays in a community including behavior and influence.  
2. Niche is also defined as the ultimate distributional unit within which a species is restrained by the limitations of its physical structure and its physiology.

**19. Autecology with an Example:** -  
See Exercise Answer No: 5

**20. Humus:** -  
It is the partially decaying organic matter which is formed by partial decay of animal and plant matter  
Or

The dark organic material in the soils produced by the decomposition of vegetable or animal matter and essential to the fertility of the earth is called humus.

**21. Difference between Nitrification and Denitrification.**

| Nitrification                                                                                                       | Denitrification                                                                                                              |
|---------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| 1. Nitrification is the conversion of ammonia (NH <sub>3</sub> ) or ammonium (NH <sub>4</sub> ) to nitrates.        | 1. Denitrification is the conversion of nitrate back to nitrogen gas, which enters the atmosphere.                           |
| 2. It is an oxidation process.                                                                                      | 2. It is a reduction process.                                                                                                |
| 3. Nitrification is accomplished by two groups of nitrifying bacteria ( <i>Nitrosomonas</i> , <i>Nitrobacter</i> ). | 3. Denitrification is accomplished by denitrifying bacteria such as <i>Pseudomonas</i> .                                     |
| 4. Nitrification is the production of nitrates.                                                                     | 4. It is the reverse process of nitrification in which nitrate is converted back into nitrogen gas, which enters atmosphere. |
| 5. It increases soil fertility.                                                                                     | 5. Excessive denitrification reduces                                                                                         |
| 6. Nitrification takes place in well aerated                                                                        |                                                                                                                              |



soils because the bacteria responsible for it are aerobic.

soil fertility.  
6. It is stimulated by water logging, lack of aeration and accumulation of organic matter in the soil because denitrifying bacteria are anaerobic bacteria and they use nitrates as oxidizing agent instead of oxygen.

## 22. Commensalism: -

See Lahore Board Answer No: 18

## 23. Differences between Pioneers and Climax Community: -

See Multan Board Answer No: 19

## 24. Biogeochemical Cycle: -

See Exercise Chapter No: 25 Answer No: 1

## 25. Assimilation: -

See D.G.K Bord Answer No: 8 (B)

## 26. Differences between Synecology and Autecology:-

See Lahore Board Answer No: 17

## SAHIWAL BOARD QUESTIONS

- Write a brief note on crustose lichen stage.  
(Sahiwal Board-2013-A)
- Explain denitrification. (Sahiwal Board-2013-A)
- Write a short note on Commensalism.  
(Sahiwal Board-Old Scheme-2014-A)
- Differentiate between Micronutrients and Macronutrients. (Sahiwal Board-Old Scheme-2014-A)
- Define infestations.  
(Sahiwal Board-Old Scheme-2014-A)
- Differentiate between Autecology and Synecology.  
(Sahiwal Board-New Scheme-2014-A)
- What is succession?  
(Sahiwal Board-New Scheme-2014-A)
- What is mutualism? Give example.  
(Sahiwal Board-New Scheme-2014-A)
- What is nutrient cycle?  
(Sahiwal Board-New Scheme-2015-A)
- Compare autecology and synecology.  
(Sahiwal Board-New Scheme-2015-A)
- Who and when proposed the term Niche?  
(Sahiwal Board-New Scheme-2015-A)
- Name the animals involved in predator / prey interaction as an example.  
(Sahiwal Board-New Scheme-2015-A)

## Answers

### 1. A Brief Note on Crustose Lichen Stage: -

In this stage special types of lichens grow on the surface of rock in the form of crust. The lichens can

withstand extreme environmental conditions. The surface sometimes get wet due to rain and dew drops.

They absorb water and remain dormant rather than desiccated in dry season

### 2. Denitrification: -

- Denitrification is the conversion of nitrate back to nitrogen gas, which enters the atmosphere. Or Denitrification is the conversion of nitrates ( $\text{NO}_2^-$ )

into

atmospheric nitrogen.

- It occurs by certain anaerobic bacteria in the soil (nitrifying bacteria) such as *Pseudomonas*.
- Denitrifying bacteria living in the anaerobic mud of lakes, bogs, and estuaries carry out this process as a part of their own metabolism.
- It is part of nitrogen cycle.
- It decreases soil fertility.

### 3. A Short Note on Commensalism: -

- Commensalism is the symbiotic association of two organisms of different species in which one member

(commensal) is benefited, and the other (host) is neither harmed nor helped by the association. Or Commensalism is a type of symbiosis in which one of the partners gets benefit while the other is neither benefited nor harmed.

- In some cases, the two partners remain permanently associated with each other.
- In certain cases, the association is not so continuous or permanent.

### B) Example: -

- Remora is a small fish which attaches itself, with the help of its sucker, just behind the mouth opening of the shark. It takes a free ride and swallow the falling out pieces of food as the shark eats its prey. The shark

does not benefit from this relationship nor its skin harmed by the sucker of remora.

- Another common example of commensals is spirochaetes, a kind of spiral shaped bacteria, living in between our teeth to obtain food but causes no harm.
- Epiphytes are small plants found growing on other large plants for space only. They absorb water and minerals from atmosphere and prepare their own food.

The larger plants are neither benefited nor harmed in any way. Epiphytes are common in in tropical rain forest. The Orchids and Mosses are common epiphytes.

- Fierasfer is a small fish that takes shelter at times of danger in the cloaca of a sea cucumber. This is another

example of commensalism.

- Barnacles attached to the back whales and turtles, get a free ride to better feeding places.
- Certain crabs live in the mantle cavities of sea mussels for protection.
- Crabs that live in the tubes of annelid worms is

- another example of commensalism.
4. **Differentiate between Micronutrients and Macronutrients: -**  
See Multan Board Answer No: 5
  5. **Infestations: -**  
Diseases in living organisms which are caused by parasites are called infestations.
  6. **Differences between Autecology and Synecology: -**  
See Lahore Board Answer No: 17
  7. **Succession: -**  
See Multan Board Answer No: 11
  8. **Mutualism with Example: -**  
See Bahawalpur Board Answer No: 15
  9. **Nutrient Cycle: -**  
See Multan Board Answer No: 25
  10. **Comparison of Autecology and Synecology: -**  
See Lahore Board Answer No: 17
  11. **A) Who proposed the term Niche: -**  
Joseph Grinnell  
**B) When the Term Niche was Proposed: -**  
In 1917
  12. **Names of the Animals Involved in Predator / Prey Interaction as an Example: -**  
Cat/mouse, fox/rabbit, seal/fish, frog/mosquito, hawk/small birds etc.

## C h a p t e r ----

### 26

## SOME MAJOR ECOSYSTEMS

2 SQs

### I) From Exercise:- Questions

1. Define productivity of an ecosystem.
2. List four adaptations in plants and animals for terrestrial ecosystem.
3. Name three zones in lake ecosystem.
4. How many biomes are present in the world, name only five of them.
5. Give the names of some major ecosystems on land in Pakistan.

### Answers

1. **Productivity of an Ecosystem: -**  
1. Productivity can be defined as the rate of production of new biomass during a unit time.  
2. The productivity can be indicated by consumption of oxygen and release of oxygen in the process of photosynthesis.  
3. The productivity of aquatic ecosystem is basically determined by:  
a. **Light: -**  
Light intensity and quality vary with the water depth, so the primary productivity also varies with light.

- b. **Nutrients: -**  
The amount of nutrients also changes with season.  
So productivity also varies from zone to zone.
2. **List of Four Adaptations in Plant and Animals for Terrestrial Ecosystem: -**  
1. **Supporting Tissues in Plants: -**  
The land plants have evolved supporting tissues like vascular bundles (xylem-phloem) to support them on land against the force of gravity.  
2. **Supporting Tissues in Animals: -**  
The land animals have evolved supporting tissues like skeleton and cartilage to support them on land against the force of gravity.
3. **Conservation of Water: -**  
Plants and animals evolved various methods to conserve water in their body e.g. homeostasis.
4. **Temperature Regulation: -**  
The mechanism of temperature regulation was developed by land plants and animals by developing bark and skin respectively.
3. **Names of Three Zones in Lake Ecosystem: -**  
1. Littoral zone -- Shallow water region near the shore with light penetrating the bottom  
2. Limnetic zone -- Open water zone away from the shore to the depth of effective light penetration  
3. Profundal zone --- Zone of deep water under the limnetic zone, beyond the reach of light penetration
4. **Biomes Present in the World with Only Names of Five: -**  
1. Forest Ecosystem  
a. Tropical Rain Forests  
b. Coniferous Alpine and Boreal Forests  
2. Grass Land Ecosystem  
3. Desert Ecosystem  
4. Tundra Ecosystem
5. **Names of Some Major Ecosystems on Land in Pakistan: -**  
1. Temperate Deciduous Forests  
2. Coniferous Alpine and Boreal Forests  
3. Grassland Ecosystem  
4. Desert Ecosystem  
5. Tundra Ecosystem

### II) From Punjab Boards:- LAHORE BOARD QUESTIONS

1. Differentiate between Phytoplankton and Zooplankton.  
(Lahore Board-2008-  
A)  
2. Define the productivity of an ecosystem.  
(Lahore Board-2008-  
A)  
3. Differentiate between alpine and boreal forests.  
(Lahore Board-2009-  
A)  
4. What is a climate? (Lahore Board-2009-  
A)  
5. Write two adaptations for terrestrial ecosystem shown

- by living organisms. (Lahore Board-2010-A)
6. What is the effect of human impact on desert ecosystem? (Lahore Board-2010-A)
7. Differentiate between climate and weather. (Lahore Board-2011-A)
8. Compare phytoplankton and zooplankton. (Lahore Board-2011-A)
9. What is composition of air of terrestrial ecosystem? (Lahore Board-Group-I-2012-A)
10. Describe animal life of grass land ecosystem. (Lahore Board-Group-I-2012-A)
11. Give two adaptations for terrestrial ecosystem. (Lahore Board-Group-II-2012-A)
12. Discuss animals life of temperate deciduous forests. (Lahore Board-Group-II-2012-A)
13. What is the effect of human impact on Tundra Ecosystem. (Lahore Board-Group-I-2013-A)
14. Characterize littoral zone of fresh water lakes. (Lahore Board-Group-I-2013-A)
15. Give the Layering characteristics of grassland. (Lahore Board-Group-II-2013-A)
16. Mention the characteristics of plant life in desert ecosystem. (Lahore Board-Group-II-2013-A)
17. Give location of Tundra Ecosystem in Pakistan. (Lahore Board-New Scheme-Group-I-2014-A)
18. What is limnetic zone? Mention its life. (Lahore Board-New Scheme-Group-I-2014-A)
19. What is climate? (Lahore Board-New Scheme-Group-II-2014-A)
20. Differentiate between alpine and boreal coniferous forests. (Lahore Board-New Scheme-Group-II-2014-A)

## Answers

### 1. Differences between Phytoplankton and Zooplankton: -

| Phytoplanktons                                                                                                                                                                                                                                                          | Zooplanktons                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Phytoplanktons are photosynthetic organisms, including cyanobacteria, autotrophic bacteria and free-floating algae.<br>1. Phytoplanktons make their own food through photosynthesis.<br>2. Phytoplanktons are found on the surface of the water where there is a lot | 1. Zooplanktons are non-photosynthetic organisms that include protozoans, tiny crustaceans, and the larval stages of many animals. ▲<br>1. Zooplanktons survive on other life forms in the water. Phytoplankton is the chief food source for the zooplankton. |

|                                                                                                      |                                                                                                                                                                       |
|------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| of sunlight.<br>3. Phytoplanktons release oxygen in the water through the process of photosynthesis. | 2. Zooplanktons prefer darker and cooler area of the water. They travel to the surface of the water during day time<br>3. Zooplanktons consume oxygen from the water. |
|------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### 2. Productivity of an Ecosystem: -

See Exercise Answer No: 1

### 3. Differences between Alpine and Boreal Forests: -

| Alpine Forests                                                         | Boreal Forests                                                         |
|------------------------------------------------------------------------|------------------------------------------------------------------------|
| Coniferous forests located at high altitude are called Alpine forests. | Coniferous forests located at high latitude are called Boreal forests. |

### 4. Climate: -

1. Climate refers to overall patterns of weather that prevail from year to year and even country to country in a particular region.

2. Climate generally changes slowly, over hundreds or thousands of years.

### 5. Two Adaptations for Terrestrial Ecosystem: -

#### 1. Supporting Tissues: -

The land animals and plants have evolved supporting tissues like skeleton in animals and wood (xylem)

and other strengthening tissues in plants to support them

on land. Without these supporting tissues, land

organisms might collapse due to their own weight and the pull

of gravity.

#### 2. Conservation of Water: -

Plants and animals have evolved various methods to conserve water in their body, that is, storage of water in their body and prevention of loss of water from

the body.

### 6. Effect of Human Impact on Desert Ecosystem: -

The human activity has caused desertification e.g.,

the Sahara desert in Africa. Here the rainfall is less than average and rapid growth of the population has extended the desert southward. The loss of productivity of ecosystem has caused famines.

Ethiopia where famines in mid 1980s occurred

causing thousands of death is an example

### 7. Differences between Climate and Weather: -

| Climate                                                                                                                                                                   | Weather                                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1. Climate is the average daily weather for an extended period of time at a certain location.<br>2. Climate generally changes slowly, over hundreds or thousands of year. | 1. Weather reflects short term conditions of atmosphere.<br>2. Weather changes rapidly. |

### 8. Comparison of Phytoplankton and Zooplankton: -

See Lahore Board Answer No: 1

### 9. Composition of Air of Terrestrial Ecosystem: -

Composition of terrestrial ecosystem is more uniform as it is in constant motion. The amount of  $O_2$  and  $CO_2$  in air is much constant and most beneficial to terrestrial ecosystem.

#### 10. Animal Life of Grass Land Ecosystem: -

1. Dominant species are herbivores.
2. Invertebrates including insects are very numerous, grasshopper becomes so numerous that they can compete with other herbivores for plant foliage.
3. The predators are reptiles, amphibians and mammals. For example, lizards, toads, turtles prey on insects; foxes and wolves among mammals are very common.
4. Large animals like zebras, wild horses, bison are important.
5. Among decomposers, many bacteria, actinomycetes and fungi like molds, yeasts, mushrooms, bracket fungi are most common.

#### 11. Two Adaptations for Terrestrial Ecosystem: -

See Lahore Board Answer No: 5

#### 12. Animal Life of Temperate Deciduous Forests: -

1. Some very common animals are:
  - a. Rhesus monkey (*Macaca mulatto*)
  - b. Black bear (*Solenorotos tibitanus*)
  - c. Leopard cat (*Felis bengalensis*)
  - d. Deer
  - e. Wolves
  - d. Earthworm and various microorganisms (bacteria and fungi) to convert the litter into organic matter. Or
1. These forests contained a variety of large mammals such as mountain lions, wolves, bison, and other species now regionally extinct.
2. White-tailed deer, black bears, beaver, red foxes, raccoons and small herbivores such as squirrels, cottontail rabbits, shrews, skunks, chipmunks are familiar animals of the temperate deciduous forests.
3. Amphibians and reptiles also occur in this region. Amphibians such as spotted salamander and wood frogs are abundant. Reptiles including box turtle and rat snakes are present.
4. Ground birds such as wild turkeys, pheasants, grouse, blue jays, scarlet tanagers are present.
5. Bacteria, protozoans, arthropods and worms such as earthworm are also present that thrive on dead organic matter.
6. Animal life of moist temperate regions of Shogran and

Neelum Valley in Pakistan are:

- a. Rhesus monkey (*Macaca mulatto*)
- b. Black bear (*Solenorotos tibitanus*)
- c. Leopard cat (*Felis bengalensis*)

#### 13. Effect of Human Impact on Tundra Ecosystem: -

Human activities in the tundra leave scars that persist for centuries. Fortunately, for the tundra inhabitants,

the impact of civilization is localized around drilling sites, pipelines, mines, military bases. Or

1. Tundra regenerates quite slowly after it has been disturbed. Hence the human activities in the tundra leave scars that persist for centuries.
2. Even casual use by hikers causes damage to tundra.
3. Long lasting injury, likely to persist for hundreds of year, was done to large portions of tundra as a result of oil exploration and military use.

#### 14. Characters of Littoral Zone of Fresh Water Lakes:

1. It is a shallow water area along the shore of a lake or pond.
2. In littoral zone, light penetrates to the bottom.
3. Littoral zone is the most productive zone of the lake.
4. Photosynthesis is greatest in littoral zone.
5. It includes rooted, emergent vegetation plus several deeper-dwelling aquatic plants and algae.
6. Rooted plants provide habitat for numerous protozoans invertebrates, fishes and some reptiles.

#### 15. Layering Characteristics of Grassland: -

Layering is the characteristic of grassland. Grassland consists of following three layers:

- a. Tall grasses (*Andropogon*, *Panicum*) form the first layer
- b. Mid high grasses (*Stipa*, *Sporobolus*, *Oryzopsis*) form the second layer.
- c. Third layer is formed by short grasses and forbs and warfare species (*Poa*, *Bromus*) with mosses and lichens.

#### 16. Characteristics of Plant Life in Desert Ecosystem: -

1. Plants are covered with waterproof waxy coating to prevent evaporation of precious water.
2. Desert plants conserve water in a variety of ways. For example, Cacti and Euphorbia have fleshy stems in which water is stored for use during the period of drought.
3. Some plants have shallow root systems that spread below the surface of soil. These plants absorb water quickly before it is evaporated.
4. Some other desert plants have deep roots and absorb water from deeper layers of the soil.

#### 17. Location of Tundra Ecosystem in Pakistan: -

Tundra is located in mountains of Kara-Koram and Hindukush in Pakistan.

#### 18. A) Limnetic Zone: -

1. It is the open water zone.
2. It is beyond the littoral zone away from the shore.
3. It extends down as far as sunlight penetrates to permit photosynthesis.

#### B) Life in Limnetic Zone: -

1. The main producers of this zone are phytoplankton mainly cyanobacteria.
2. Limnetic zooplankton are protozoa, small crustaceans and rotifers.
2. Large fishes spend some of their time in the limnetic

zone and feed on protozoa and small crustaceans.

#### 19. Climate: -

1. Climate is the average conditions, plus extremes (records), that occur in a given place over a period of years.
2. Climate generally changes slowly, over hundreds or thousands of years.
3. The two most important factors that determine an area's climate are:
  - a. Temperature (both average and extreme)
  - b. Precipitation (both average and seasonal distribution)
4. Other climate factors include wind, humidity, fog, cloud cover, and lightning-caused wildfires.

#### 20. Differences between Alpine and Boreal Coniferous

Forests: -

See Lahore Board Answer No: 3

#### GUJRANWALA BOARD QUESTIONS

1. Name different zones of fresh water lake.  
(Gujranwala Board-2008-  
A)
2. What are alpine? (Gujranwala Board-2008-  
A)
3. What are alpine or boreal forests?  
(Gujranwala Board-2009-  
A)
4. Name different zones of freshwater lake.  
(Gujranwala Board-2009-  
A)
5. What type of animals are present in littoral zone?  
(Gujranwala Board-2010-  
A)
6. Define plankton. Give its types.  
(Gujranwala Board-2011-  
A)
7. What are phytoplanktons? Give examples.  
(Gujranwala Board-2012-  
A)
8. Define temperate deciduous forest. Mention various such forests in Pakistan. (Gujranwala Board-2012-  
A)
9. Write about limnetic zone.  
(Gujranwala Board-2013-  
A)
10. What type of plant life is present in desert ecosystem?  
(Gujranwala Board-2013-  
A)
11. What do you meant by limnetic zone.  
(Gujranwala Board-New Scheme-2014-  
A)
12. Where Thal and Thar are situated?  
(Gujranwala Board-New Scheme-2014-  
A)
13. Differentiate between savanna and prairies.  
(Gujranwala Board-New Scheme-2014-  
A)
14. Differentiate between limnetic zone and profundal zone. (Gujranwala Board-New Scheme-2015-  
A)
15. What is layering? Give one example.  
(Gujranwala Board-New Scheme-2015-  
A)

#### Answers

##### 1. Names of Different Zones of Fresh Water Lake: -

1. Littoral Zone
2. Limnetic Zone
3. Profundal Zone

##### 2. Alpines: -

1. Alpines are the coniferous forests located at high altitude.
2. Alpine is also biome called alpine tundra similar to arctic tundra, that is located at high altitude across the mountains above tree line.

##### 3. A) Alpine Forests: -

These are the coniferous forests located at high altitudes.

##### B) Boreal Forests: -

1. Coniferous forests located at high latitudes are called boreals.
2. They are the coniferous forests of the north hence are also called Taiga.
3. They exist south of the tundra.
4. They are one of the largest forests on earth.
5. They have evergreen conifer trees belonging to gymnosperm group with needle like leaves.

##### 4. Names of Different Zones of Freshwater Lake: -

See Exercise Answer No: 3

##### 5. Type of Animals Present in Littoral Zone: -

The great diversity of animals in the lake is found in littoral zone.

1. Littoral invertebrate animals include small crustaceans, insect larvae, snails, flatworms, Hydra.
2. Littoral vertebrates include frogs, aquatic snakes and turtles.  
Or  
1. Littoral invertebrates include worms, beetles, insect larvae, insect nymphs, snails, clams, flatworms, Hydra, crayfish and other small crustaceans.
2. Littoral vertebrates include frogs and their tadpoles, turtles, aquatic snakes and many fishes such as perch, carp and bass.

##### 6. A) Plankton: -

1. They are free floating mostly microscopic aquatic organisms.  
Or  
These are freshwater and marine organisms that are suspended on or near the surface of water. Or  
They are free-floating, mainly microscopic organisms found in the upper layers of water.
2. They are usually small or microscopic organisms.
3. They are relatively feeble swimmers. For the most part, they are carried about at the mercy of currents and waves.
4. They are found at different depths of water at different times of the day or at different seasons.

##### B) Types of Plankton: -

Planktons are generally sub-divided into two major types:

- a. Phytoplankton (Greek "drifting plants"):-

1. They are producers that form the base of most aquatic food webs.

2. They include include photosynthetic protista, bacteria, cyanobacteria and algae.

**b. Zooplankton (Greek "drifting animals"):** -

1. They are non-photosynthetic organisms.

2. They include protozoa, tiny crustaceans, and larval stages of many animals.

**7. A) Phytoplanktons:** -

1. They are producers (photosynthetic organisms) that form the base of most aquatic food webs.

2. Phytoplanktons make their own food through photosynthesis.

3. Phytoplanktons are found on the surface of the water where there is a lot of sunlight.

4. Phytoplanktons release oxygen in the water through the process of photosynthesis.

**B) Examples of Phytoplanktons:** -

1. Photosynthetic Protista

2. Cyanobacteria

3. Autotrophic Bacteria

4. Free-floating Algae

8. Define temperate deciduous forest. Mention various such forests in Pakistan. (Gujranwala Board-2012-13)

**8. A) Temperate Deciduous Forest:** -

These are forests of temperate regions which consist of

broad-leaf hardwood trees that usually shed off their leaves during winter season. They may also be dry, monsoonal (tropical) and moist semi deciduous.

**B) Temperate Deciduous Forests in Pakistan:** -

In Pakistan, temperate deciduous forests are found in Neelum valley and Shogran.

**9. Limnetic Zone:** -

1. In Limnetic zone, light penetrates to support photosynthesis.

2. In this zone, phytoplankton includes cyanobacteria (blue green algae) which serve as producers.

3. Phytoplanktons are eaten by protozoa and small crustaceans, which in turn are consumed by fishes.

**10. Type of Plant Life in Desert Ecosystem:** -

1. Perennial plants are bushes or cacti with large shallow root systems.

2. The individual plants, in the desert are widely spaced with large bare areas separating them. Or Familiar plants are *Prosopis*, *Capparis*, *Lycium* etc. Dry farmings of varieties like Sorghum and Bajra is suitable for these regions.

**11. Limnetic Zone:** -

1. It is the open water zone away from the shore to the depth of effective light penetration to support photosynthesis.

2. Its phytoplanktons are cyanobacteria while zooplankton are protozoa, few crustacean species and rotifers.

**12. A) Location of Thal:** -

Thal is located in Western Punjab (Mianwali and

Bukhar).

**B) Location of Thal:** -

Thal is located in Sindh.

**13. Differences between Savanna and Prairie:** -

| Savanna                                     | Prairie                                                        |
|---------------------------------------------|----------------------------------------------------------------|
| 1. Savanna is tropical grassland.           | 1. Prairie is temperate grassland.                             |
| 2. They contain scattered trees.            | 2. These grasslands do not have woody plants.                  |
| 3. Savanna prefer warm or hot climate.      | 2. Prairie prefer temperature that vary from summer to winter. |
| 4. Savanna need more rainfall than prairie. | 3. Prairie need less rainfall than savanna.                    |
| 5. Savanna cover almost half of the Africa. | 4. It includes Prairies of North America, Pampas of Argentina. |

**14. Differences Between Limnetic Zone and Profundal Zone:** -

| Limnetic Zone                                                                                                              | Profundal Zone                                                                                       |
|----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| 1. It is deep open water zone away from shore.                                                                             | 1. It is deep water zone below limnetic zone that overlies the sediment at the bottom of the lake.   |
| 2. In this zone enough light penetrates to support photosynthesis.                                                         | 2. Here light is insufficient to support photosynthesis.                                             |
| 3. Floating algae and cyanobacteria live here.                                                                             | 3. Algae do not live here.                                                                           |
| 4. It is inhabited by cyanobacteria, floating algae, protozoa, crustacean and fish.                                        | 4. Decomposers (bacteria and fungi), detritus feeder (snails, insect larvae) and fishes inhabit it.  |
| 5. Cyanobacteria act as producers which are eaten by protozoa and small crustaceans, which in turn are consumed by fishes. | 3. Food drifts into the profundal zone from the littoral and limnetic zones in the form of detritus. |
| 6. This zone is mineral poor and aerobic (oxygen rich).                                                                    | 4. This zone tends to be both mineral rich and anaerobic (oxygen deficient).                         |

**15. A) Layering:** -

1. Arrangement of different types of grasses in layers is called layering.

2. Layering is the characteristic of grassland.

3. Grassland usually consists of three layers

**B) One Example:** -

Tall grasses (*Andropogon*, *Panicum*) form the first layer of grassland.

### MULTAN BOARD QUESTIONS

1. How has been Sahara desert in Africa spread southward

in about three last decade? (Multan Board-2008-09)

A)

2. Define productivity of an Ecosystem.

(Multan Board-2008-09)

S)

3. Define weather.

(Multan Board-2008-09)

S)

4. Differentiate between Climate and Weather.

(Multan Board-2009-10)

A)

5. What are the adaptations of desert animals to conserve water? (Multan Board-2009-A)
6. What do you know about Lithospheric Ecosystem? (Multan Board-2009-S)
7. What are two major terrestrial ecosystem? (Multan Board-2009-S)
8. How the productivity of an Aquatic Ecosystem can be determined? (Multan Board-2010-A)
9. Distinguish between Alpine and Boreal Forests. (Multan Board-2010-A)
10. What are the soil conditions of grassland? (Multan Board-2010-S)
11. Distinguish between alpine and boreal coniferous forests. (Multan Board-2010-S)
12. How the productivity of an Aquatic Ecosystem can be determined? (Multan Board-2011-A)
13. What is the effect of human impact on Tundra Ecosystem? (Multan Board-2011-A)
14. Differentiate between Alpine and Boreal forests. (Multan Board-2011-S)
15. Give the characteristics of Limnetic Zone of Fresh Water Ecosystem. (Multan Board-2012-A)
16. What type of animal life is found in Tundra? (Multan Board-2012-A)
17. What is layering in grass land? (Multan Board-2012-S)
18. What is the difference between Savanna and Prairies. (Multan Board-2012-S)
19. What is layering in grassland ecosystem? (Multan Board-2013-A)
20. What type of animal life is present in the Tundra Ecosystem? (Multan Board-2013-A)
21. Compare rainfall in Temperate Deciduous and Grassland Ecosystem. (Multan Board-Old Scheme-2014-A)
22. What are the features of Aquatic Ecosystem? (Multan Board-Old Scheme-2014-A)
23. Write a note on Profundal Zone. (Multan Board-New Scheme-2014-A)
24. Explain layering in grassland ecosystem.

(Multan Board-New Scheme-2014-

- A)
25. Differentiate between Phytoplankton and Zooplankton. (Multan Board-New Scheme-2015-A)
26. Write two adaptations for terrestrial ecosystem. (Multan Board-New Scheme-2015-A)

### Answers

1. **Spread of Sahara Desert in Africa: -**  
Sahra desert in Africa has spread southward in about three last decade due to twenty five years of below average rainfall, coupled with rapid growth of human population.
2. **Productivity of an Ecosystem: -**  
See Exercise Answer No: 1
3. **Weather: -**
  1. Weather refers to short term fluctuations in temperature, humidity, cloud cover, wind, and precipitation over periods of hours or days.
  2. It changes rapidly.
4. **Differences between Climate and Weather: -**  
See Lahore Board Answer No: 7
5. **Adaptations of Desert Animals To Conserve Water:**  
See Lahore Board Answer No: 16
6. **Lithospheric Ecosystem: -**
  1. The ecosystem present on land or soil is called terrestrial or lithospheric ecosystem.
  2. Terrestrial ecosystem receives plenty of light and the soil provides ecosystem nutrients, water, however is limited and very unevenly distributed both in place and time.
7. **Two Major Terrestrial Ecosystem: -**
  1. Forest Ecosystem
  2. Desert Ecosystem
8. **Determination of Productivity of an Aquatic Ecosystem: -**  
The productivity aquatic ecosystem is basically determined by the light and nutrients.
9. **Differences between Alpine and Boreal Forests: -**  
Alpines forests are found at high altitudes while boreal forests are located at high latitude.
10. **Soil Conditions of Grassland: -**  
The soil moisture is limited on account of low precipitation and high evaporation. Upper soil layer in which grasses are rooted is normally moist but deeper layers are constantly dry. The soil of grassland is basically impermeable with excessive salinity.
11. **Differences between Alpine and Boreal Coniferous Forests: -**  
See Multan Board Answer No: 9
12. **Determination of Productivity of an Aquatic Ecosystem: -**  
See Multan Board Answer No: 8
13. **Effect of Human Impact on Tundra Ecosystem: -**  
See Lahore Board Answer No: 13
14. **Differences between Alpine and Boreal Forests: -**

See Multan Board Answer No: 9

**15. Characteristics of Limnetic Zone of Fresh Water Ecosystem: -**

See Lahore Board Answer No: 18 (A)

**16. Type of Animal Life in Tundra: -**

1. The standing pools provide superb mosquito habitat.
2. The mosquitoes and other insects provide food for numerous birds (ducks and geese) more of which migrate a long distance to nest and raise their young during brief summer feast.
3. The tundra vegetation supports lemmings, which are eaten by wolves, snowy owls, arctic foxes even grizzly bears.

**17. Layering in Grass Land: -**

See Lahore Board Answer No: 15

**18. Difference between Savanna and Prairies: -**

See Gujranwala board Answer No: 13

**19. Layering in Grassland Ecosystem: -**

See Lahore Board Answer No: 15

**20. Type of Animal Life Tundra Ecosystem: -**

See Multan Board Answer No: 16

**21. Comparison of Rainfall in Temperate Deciduous and Grassland Ecosystem: -**

| Temperate Deciduous Forests                           | Grassland Ecosystem                                                                                                                      |
|-------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| The average rainfall is between 750-1500 mm per year. | Annual rain fall is about 250 to 750 mm (10 to 30 inches) but it reaches to 1500 mm (60 inches) in tropical and sub-tropical grasslands. |

**22. Features of Aquatic Ecosystem: -**

1. Temperature in aquatic system is more moderate to support life.
2. Water absorbs a considerable amount of light energy that sustains life.
3. Nutrients in aquatic ecosystem tend to be concentrated near the bottom sediments supporting life where light levels often are too low to support photosynthesis.
4. Water is an essential requirement for life. It is available in aquatic ecosystem to support life.

**23. Note on Profundal Zone: -**

1. In profundal zone, light is insufficient to support Photosynthesis.
2. The organisms of this zone are mainly nourished by detritus that falls from the littoral and limnetic zone and by incoming sediment.
3. Decomposers and detritus feeders, such as, snails and certain insect larvae, bacteria, fungi, fishes, inhabit it.

**24. Layering in Grassland Ecosystem: -**

See Lahore Board Answer No: 15

**25. Differences between Phytoplankton and Zooplankton: -**

See Lahore Board Answer No: 1

**26. Two Adaptations for Terrestrial Ecosystem: -**

See Lahore Board Answer No: 5

**BAHAWALPUR BOARD QUESTIONS**

1. Define productivity of an ecosystem.  
(Bahawalpur Board-2008-A)

2. Write down three zones in lake ecosystem.  
(Bahawalpur Board-2008-A)
3. Differentiate between weather and climate.  
(Bahawalpur Board-2009-A)
4. What type of organisms are present in profundal zone of lake?  
(Bahawalpur Board-2009-A)
5. Differentiate between Phytoplankton and Zooplankton.  
(Bahawalpur Board-2009-A)
6. What is Desertification? (Bahawalpur Board-2010-A)
7. Differentiate between Weather and Climate.  
(Bahawalpur Board-2010-A)
8. Describe Life Distribution in Limnetic Zone.  
(Bahawalpur Board-2011-A)
9. What is the significance of Copepod?  
(Bahawalpur Board-2012-A)
10. Name four major Ecosystems in Pakistan.  
(Bahawalpur Board-2012-A)
11. What are Copepods and give the habitat?  
(Bahawalpur Board-2013-A)
12. What is Tundra and types of its vegetation?  
(Bahawalpur Board-2013-A)
13. Write Flora and Fauna of Tundra Ecosystem.  
(Bahawalpur Board-New Scheme-2014-A)
14. Define plankton and give its types.  
(Bahawalpur Board-New Scheme-2014-A)
15. Write human impact on Tundra Ecosystem.  
(Bahawalpur Board-New Scheme-2015-A)
16. Differentiate between Prairies and Savanna.  
(Bahawalpur Board-New Scheme-2015-A)

**Answers**

**1. Productivity of an Ecosystem: -**

See Exercise Answer No: 1

**2. Three Zones in Lake Ecosystem: -**

See Exercise Answer No: 3

**3. Differences between Weather and Climate.**

See Lahore Board Answer No: 7

**4. Type of Organisms in Profundal Zone of Lake:**

This zone contains very few species. The community here is represented by bacteria, fungi, blood worms (chironomid larvae), annelids and small clams. Animals of this zone are adapted to low oxygen concentration, whereas bacteria may be anaerobic. Many pond fish spend much of their time in this zone.

**5. Differences between Phytoplankton and Zooplankton: -**

See Lahore Board Answer No: 1



**6. Desertification: -**

1. It is the degradation of once fertile land into non-productive desert.
2. It is caused by soil erosion, deforestation and overgrazing by domestic animals.
3. Desertification is a progressive process that reduces the

productivity of the land, decreasing its ability to support crops or livestock.

4. Human activities are causing the spread of deserts through a process of desertification. A dramatic example is occurring in Sahel, which borders the southern edge of the Sahara desert in Africa.

**7. Differences between Weather and Climate: -**

See Lahore Board Answer No: 7

**8. Life Distribution in Limnetic Zone: -**

See Lahore Board Answer No: 18 (B)

**9. Significance of Copepod: -**

1. Copepods are of great ecological importance, providing food for many species of fish.
2. Copepods are key components of marine food chain and serve either directly or indirectly as food sources for most commercially important fish species.

**10. Names of Four Major Ecosystems in Pakistan: -**

1. Tundra Ecosystem -----Mountains Kara-Koram and Hindukush
2. Desert Ecosystem ---- Mianwalli, Bakhar, Fort Abbas
3. Grassland Ecosystem --- Waziristan, Lower Chitral, North Kallat, Gilgit. Kashmir
4. Temperate Deciduous Forests ---- Shogran and Neelum Valley

**11. A) Copepods: -**

Copepods are a group of small crustaceans.

**B) Habitat of Copepods: -**

They are found in the sea and nearly every freshwater habitat. Some species are planktonic (drifting in sea waters), some are benthic (living on the ocean floor).

**12. A) Tundra: -**

1. Tundra (also called arctic tundra) is a vast treeless region in extreme northern latitudes between taiga and polar ice caps that borders the Arctic ocean.
2. Arctic tundra consists of a very large area of land about 5 million acres across Northern North America, Northern Europe and Siberia (with high latitude).
2. A similar ecosystem, called the alpine tundra, occurs above the timberline on mountain ranges such as mountains of Karakoram and Hindu Kush in Pakistan.

**B) Types of Vegetation in Tundra: -**

1. Trees and shrubs are small and are mostly confined to the margins of the streams and lakes in sheltered locations. Dwarf willows (10 cm or 4 inches in height with trunk 7cm or 3 inches in diameter), dwarf birches and other dwarf trees are common.

2. Herbs of tundra are perennials that grow rapidly during the brief summers and live 20 to 50 years. Predominant herbs are grasses, mosses, grass-like sedges, large lichens (including reeinder moss), flowering herbs like *Aconita* and *Geranium*, rushes and heath.

**13. Flora and Fauna of Tundra Ecosystem: -****1. Flora of Tundra: -**

The predominant plants are grasses, mosses, grass-like

sedges, large lichens (including reeinder moss), flowering herbs like *Aconita* and *Geranium*, rushes and heath, dwarf willows,

**2. Fauna of Tundra: -**

The predominant animals are mouse-like lemming, snowshoe hares, reeindeers, oxen, arctic foxes, snowy

owls, foxes, weasels, lynx, voles and ptarmigan.

**14. Plankton and its Types: -**

See Gujranwala Board Answer No: 6

**15. Human Impact on Tundra Ecosystem: -**

See Lahore Board Answer No: 13

**16. Differences between Prairies and Savanna: -**

See Gujranwala Board Answer No: 13

**FAISALABAD BOARD QUESTIONS**

1. Define Productivity of an ecosystem.  
(Faisalabad Board-2008-  
A)
2. What is meant by Productivity of an ecosystem?  
(Faisalabad Board-2009-  
A)
3. What are alpine and boreal coniferous forests?  
(Faisalabad Board-2009-  
A)
4. Compare littoral zone with limnetic zone in lake.  
(Faisalabad Board-2009-  
A)
5. Differentiate between lithosphere and Atmosphere.  
(Faisalabad Board-2010-  
A)
6. Name two dominant plants and two common animals of temperate deciduous forest.  
(Faisalabad Board-2010-  
A)
7. Give human impact on tundra ecosystem.  
(Faisalabad Board-2010-  
A)
8. Differentiate between alpine and boreal.  
(Faisalabad Board-2011-  
A)
9. What do you know about prairies?  
(Faisalabad Board-2012-  
A)
10. Define Alpine and Boreal forests.  
(Faisalabad Board-2012-  
A)
11. Differentiate between climate and weather.  
(Faisalabad Board-2013-  
A)
12. Define layering.  
(Faisalabad Board-Old Scheme-2014-  
A)

13. Differentiate between Thal and Thal.  
(Faisalabad Board-Old Scheme-2014-A)
14. Where Thal and Thal situated?  
(Faisalabad Board-New Scheme-2014-A)
15. Differentiate between svanna and parairies.  
(Faisalabad Board-New Scheme-2014-A)
16. Define productivity of an ecosystem.  
(Faisalabad Board-New Scheme-2015)
17. Give adaptations in organisms for terrestrial ecosystems.  
(Faisalabad Board-New Scheme-2015)

### Answers

- 1. Productivity of an Ecosystem: -**  
See Exercise Answer No: 1
- 2. Productivity of an Ecosystem: -**  
See Exercise Answer No: 1
- 3. Alpine and Boreal Coniferous Forests: -**  
See Gujranwala Board Answer No: 3
- 4. Comparison of Littoral Zone with Limnetic Zone in Lake: -**

| Littoral Zone                                               | Limnetic Zone                                                              |
|-------------------------------------------------------------|----------------------------------------------------------------------------|
| 1. It is shallow water region near the shore.               | 1. It is deep open water zone away from shore.                             |
| 2. Light penetrates to the bottom.                          | 2. It extends down as far as sunlight penetrates to permit photosynthesis. |
| 3. Aquatic plants are rooted in this zone.                  | 3. No rooted plant is present in this zone.                                |
| 4. Plants in this zone are the most diverse.                | 4. Owing to depth less vegetation grows here than in the littoral zone.    |
| 5. A wide variety of planktons are also found in this zone. | 5. Cynobacteria are present in this zone as phytoplankton and producers.   |
| 6. Great diversity of animals is also found in this zone.   | 6. Animal just visit this zone.                                            |

- 5. Differences between Lithosphere and Atmosphere: -**
- 6. A) Name of Two Dominant Plants of Temperate Deciduous Forest: -**
- Taxus baccata*
  - Pinus wallichiana*
- B) Names of Two Common Animals of Temperate Deciduous Forest: -**
- Deer
  - Wolves Or
  - Rhesus monkey (*Macaca mullato*)
  - Black bear (*Solenorotos tibitanus*)
- 7. Human Impact on Tundra Ecosystem: -**  
See Lahore Board Answer No: 13
- 8. Differences between Alpine and Boreal Forests: -**  
See Multan Board Answer No: 9
- 9. Parairies: -**
- The grassland without woody trees is called prairies.
  - These are present in temperate climates.

3. These grasslands do not have woody plants  
**Examples: -**  
Prairies of North America, Pampas of Argentina.

**10. Alpine Forests and Boreal Forests: -**

See Gujranwala Board Answer No: 3

**11. Differences between Climate and Weather: -**

See Lahore Board Answer No: 7

**12. Layering: -**

See Lahore Board Answer No: 15

**13. Difference between Thal and Thal: -**

| Thal                               | Thal                                                               |
|------------------------------------|--------------------------------------------------------------------|
| It is the desert located in Sindh. | It is the desert situated in Mianwali and Bukhar (Western Punjab). |

**14. Location of Thal: -**

Thal is located in Mianwali and Bukhar (Western Punjab).

**B) Location of Thal: -**

It is located in Sindh.

**15. Difference between Svanna and Parairies: -**

See Multan Board Answer No: 13

**16. Productivity of an Ecosystem: -**

See Exercise Chapter No: 26 Answer No: 1

**17. Adaptations in Organisms for Terrestrial Ecosystems: -**

See Exercise Chapter No: 26 Answer No: 2

### RAWALPINDI BOARD QUESTIONS

- Name three zones in Lake Ecosystem.  
(Rawalpindi Board-2011-A)
- What is desertification?  
(Rawalpindi Board-2011-A)
- What is climate?  
(Rawalpindi Board-2012-A)
- Give various features of profundal zone.  
(Rawalpindi Board-2012-A)
- How climate differ from weather.  
(Rawalpindi Board-2013-A)
- Name some adoptions in plants for terrestrial ecosystem.  
(Rawalpindi Board-2013-A)
- Differentiate between Coniferous Alpine and Boreal forest.  
(Rawalpindi Board-New Pattern-2014-A)
- Give two adaptations for terrestrial ecosystem.  
(Rawalpindi Board-New Pattern-2014-A)
- Name any three characters which upset the balance of nutrient cycle.  
(Rawalpindi Board-New Pattern-2014-A)
- Name three deserts of Pakistan and their location.  
(Rawalpindi Board-New Pattern-2015-A)
- Differentiate between aquatic and terrestrial ecosystem.  
(Rawalpindi Board-New Pattern-2015-A)

### Answers

- 1. Names of Three Zones in Lake Ecosystem: -**  
See Exercise Answer No: 3

**2. Desertification: -**

See Bahawalpur Board Answer No: 6

**3. Climate: -**

See Lahore Board Answer No: 4

**4. Various Features of Profundal Zone: -**

1. It is the zone of deep water beneath the limnetic zone.
2. It is the area below the limits where light can effectively penetrate.
3. This zone contains very few species.
4. Profundal zone is a dark zone and thus its inhabitants depend food for other two zones. In return this zone provides the necessary nutrients to the organisms of other two zones, which are carried up by water current.

**5. Climate Different From Weather: -**

See Lahore Board Answer No: 7

**4. Names of Some Adaptations in Plants for Terrestrial Ecosystem: -**

1. Vascular bundles and other supporting tissues to support plants against force of gravity
2. Compact multicellular body for storage of water in their body and cuticle on the epidermis to prevent loss of water from the body
3. Development of bark to regulate temperature

**5. Differences between Coniferous Alpine and Boreal Forest: -**

See Multan Board Answer No: 9

**6. Two Adaptations for Terrestrial Ecosystem: -**

See Lahore Board Answer No: 5

**7. Names of Any Three Characters Upsetting the Balance of Nutrient Cycle: -**

1

**8. Names of Three Deserts of Pakistan and Their Location: -**

1. Thal ----- Mianwali, Bukhar (Western Punjab)
2. Cholistan ---- Fort Abbas, Bahwalnagar, Yazman, Bahawl Pur (Southern Punjab)
3. Thar ---- Sindh

**9. Differences between Aquatic and Terrestrial Ecosystem: -**

| Aquatic Ecosystem                                                                                                                                                                          | Terrestrial Ecosystem                                                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| 1. Aquatic or hydrospheric ecosystem covers about 70 % of earth.                                                                                                                           | 1. Terrestrial or lithospheric ecosystem covers only 30 % of earth.          |
| 2. Water is available abundantly in aquatic system to support life.                                                                                                                        | 2. Water is limited and very unevenly distributed both in place and in time. |
| 3. It absorbs considerable light energy to sustain life. The intensity of light decreases with depth, so at the depth of 600 feet or more, a little light is left to power photosynthesis. | 3. It receives plenty of light.                                              |
| 4. Appropriate temperature is present in                                                                                                                                                   | 4. Temperature is very unevenly distributed on land in place and time.       |
|                                                                                                                                                                                            | 5. In terrestrial ecosystem, soil provides abundant nutrients.               |
|                                                                                                                                                                                            | 6. The major factors that influence the life on land                         |

aquatic system to carry out all metabolic activities.

5. The nutrients in aquatic system tend to be concentrated near the bottom sediments supporting life where light levels are often too low to support photosynthesis.
6. The major factors that determine the quantity and type of life in aquatic systems are energy and nutrients.

are temperature and amount of oxygen and carbon dioxide in air.

**SARGODHA BOARD QUESTIONS**

1. What is human impact on Tundra?  
(Sargodha Board-2010-  
A)
2. Differentiate between weather and climate.  
(Sargodha Board-2011-  
A)
3. What is the effect of human impact on Desert ecosystem?  
(Sargodha Board-2011-  
A)
4. Mention layering in grassland ecosystem.  
(Sargodha Board-2013-  
A)
5. Write down the human impact on tundra ecosystem.  
(Sargodha Board-2013-  
A)
6. What do you mean by Taiga?  
(Sargodha Board-New Scheme-2014-  
A)
7. Where Desert Ecosystems are located in Pakistan?  
(Sargodha Board-New Scheme-2014-  
A)

**Answers**

1. **Human Impact on Tundra: -**  
See Lahore Board Answer No: 13
2. **Difference between Weather and Climate: -**  
See Lahore Board Answer No: 7
3. **Effect of Human Impact on Desert Ecosystem: -**  
See Lahore Board Answer No: 6
4. **Layering in Grassland Ecosystem: -**  
See Lahore Board Answer No: 15
5. **Human Impact on Tundra Ecosystem: -**  
See Lahore Board Answer No: 13
6. **Taiga: -**
  1. Northern coniferous forests are called Taiga.
  2. Conditions in taiga are harsher than those in the temperate deciduous forests.
  3. The winters are longer and colder, and the growing season is shorter.
  4. A few months of warm weather are too short to allow trees the luxurious growth of regrowing. As a result, evergreen coniferous trees populate taiga, almost entirely with small waxy needles. The waxy coating and small surface area of the needles reduce water loss by evaporation during cold months and leaves remain on the trees year round.
7. **Locations of Desert Ecosystems in Pakistan: -**

Mianwali, For Abbas, Bahawal Nagar, Yazman,  
Bahawal Pur, Khan Pur, Rhim Yar Khan  
Sindh

### **DERA GHAZI KHAN BOARD QUESTIONS**

1. How has been Sahara desert spreading southward in about last three decades. (D.G.K. Board-2009-A)
2. How pararies differ from pampas? (D.G.K. Board-2010-A)
3. Name six major terrestrial biomes. (D.G.K. Board-2010-A)
4. Name two factors which determine productivity of aquatic system. (D.G.K. Board-2010-A)
5. How Climate differs from Weather? (D.G.K. Board-2011-A)
6. Characterize profundal zone of fresh water lakes. (D.G.K. Board-2011-A)
7. Write a brief note on profundal zone. (D.G.K. Board-Group-I-2012-A)
8. Which type of animal life is present in Tundra? (D.G.K. Board-Group-I-2012-A)
9. Differentiate between climate and weather. (D.G.K. Board-Group-II-2012-A)
10. Differentiate between Alpine and Boreal coniferous forest. (D.G.K. Board-Group-II-2012-A)
11. Give amount of rainfall in Grass land and Desert Ecosystems. (D.G.K. Board-Group-I-2013-A)
12. What are the adaptations of desert animals to conserve water? (D.G.K. Board-Group-I-2013-A)
13. What is Taiga? (D.G.K. Board-Group-II-2013-A)
14. Give four names of major Terrestrial Ecosystem in Pakistan. (D.G.K. Board-Group-II-2013-A)
15. Define Hydrospheric Ecosystem. (D.G.K. Board-New Scheme-Group-I-2014-A)
16. Compare Thal with Thar. (D.G.K. Board-New Scheme-Group-I-2014-A)
17. Explain Limnetic zone. (D.G.K. Board-New Scheme-Group-II-2014-A)
18. Give location of Tundra Ecosystem in Pakistan. (D.G.K. Board-New Scheme-Group-II-2014-A)
19. Differentiate between Svanna and Prairies. (D.G.K. Board-New Scheme-Group-I-2015-A)
20. Differentiate between alpine and boreal forests.

(D.G.K. Board-New Scheme-Group-I-2015-

- A)  
21. Differentiate between climate and wheather. (D.G.K. Board-New Scheme-Group-II-2015-A)  
22. Give two factors which influence life on land. (D.G.K. Board-New Scheme-Group-II-2015-A)

### **Answers**

1. **Spreading Sahara Desert: -**  
See Multan Board Answer No: 1
2. **Pararies different from Pampas: -**
3. **Names of Six Major Terrestrial Biomes: -**
  1. Tropical Rain Forests
  2. Temperate Deciduous Forests
  3. Coniferous Alpine and Boreal Forests
  4. Grassland Ecosystem
  5. Desrt Ecosystem
  6. Tundra Ecosystem
4. **Names of Two Factors Determining Productivity of Aquatic System: -**
  1. Light
  2. Nutrients
5. **Climate Different From Weather: -**  
See Lahore Board Answer No: 7
6. **Characters of Profundal Zone of Freshwater Lakes:**  
See Rawalpindi Board Answer No: 4
7. **Note on Profundal Zone: -**
  1. In this zone, light is insufficient to support photosynthesis.
  2. The organisms of profundal zones are mainly nourished by detritus that falls from the littoral and limnetic zone and by incoming sediments.
  3. Decomposers and detritus feeders, such as snails and certain insect larvae, bacteria, fungi, fishes inhabit it.
8. **Type of Animal Life in Tundra: -**
  1. Reptiles and amphibians are absent.
  2. Year-round animal life of the tundra includes voles, weasels, arctic foxes, gray wolves, ptarmigan, snowy owls, lemmings.
  3. Lemming populations rise and fall on a long-term cycle and are eaten by wolves, snowy owls, arctic foxes even grizzly bears.
  4. Large mammals of arctic tundra such as caribou, reindeer and musk ox are migratory, because tthere is not enough vegetation for the whole year.
  5. Mosquitoes, blackflies, and deerflies survive the winter as eggs or pupae and occur in great numbers during summer weeks.
  6. A few birds stay in the tundra for the whole year. During summer months, many birds like ducks and geese use the temporary pools and ponds as their breeding ground and feed on mosquitoes and other insects.
9. **Differences between Climate and Weather: -**  
See Lahore Board Answer No: 7
10. **Differences between Alpine and Boreal Coniferous Forests: -**  
See Multan Board Answer No: 9

**11. A) Amount of Rainfall in Grass Land Ecosystem:**

Generally rainfall lies between 250 to 750 mm (10 to 30 inches) per year but in tropical and sub-tropical grasslands, rain fall reaches about 1500 mm (60 inches) per annum. The grassland occurs in regions where mean rainfall is midway between a forest and a desert.

**B) Amount of Rainfall in Desert Ecosystems: -**

The rain fall in desert ecosystem is less than 25 to 50 cm (10-20 inches) per year and not evenly distributed.

**12. Adaptations of Desert Animals to Conserve Water: -**

1. Animals seek relief from the sun and heat in cool under ground burrows.
  2. In the dark, when desert cools down, horned lizards, snakes and other reptiles emerge to feed, as do mammals such as kangaroo, rat and birds such as burrowing owl.
  3. Most of the smaller animals survive without ever drinking at all, getting all water they need from their food and what produced during cellular respiration in their tissues.
  4. Large animals such as desert bighorn sheep and camel are dependent on permanent water holes during the drier times of the year. Or
  1. Many animals live in burrows where humidity is higher and temperature lower than that of outside the burrow.
  2. Many animals are nocturnal which is a means to avoid intense heat.
  3. Desert animals have ability to pull on with much less water. Many do not drink water and rely on the water present in their succulent foods like cactus plants.
  4. Some desert animals like reptiles and insects excrete nitrogenous wastes in the form of uric acid which requires very little water for its removal. A few species mammals have become secondarily adapted to the desert by excreting concentrated urine.
  5. Lack of sweat glands, possession of salt secreting glands and large ears to radiate heat are morphological adaptations for checking loss of water and keeping the body cool.
- 13. Taiga: -**
1. They are coniferous forests of north.
  2. They are located at high latitude hence are also called boreal forests.
  3. Taiga is the world's largest biome, covering approximately 11 % of earth's land.
  4. Coniferous trees have leaves like needles that are kept all year long.
  5. The winters are long and cold, and most of the limited precipitation (rain) falls in the summer.

**14. Four Names of Major Terrestrial Ecosystem in Pakistan: -**

1. Forest Ecosystem
2. Desert Ecosystem
3. Grassland Ecosystem
4. Tundra Ecosystem

**15. Hydrospheric Ecosystem: -**

Hydrospheric ecosystem is a "system in water in which living and non living components exchange material and transfer of energy also takes place within water".

**16. Comparison of Thal with Thar: -**

Thal is situated in Western Punjab (Mianwali and Bukhar) while Thar is situated in Sindh

**17. Limnetic Zone: -**

See Gujranwala Board Answer No: 9

**18. Location of Tundra Ecosystem in Pakistan: -**

Tundra is located in mountains of Karakoram and Koh Hindu Kush.

**19. Differences between Savanna and Prairies: -**

See Gujranwala Board Answer No: 13

**20. Differences between Alpine and Boreal Forests: -**

See Lahore Board Answer No: 3

**21. Differences between Climate and Weather: -**

See Lahore Board Answer No: 7

**22. Two Factors Which Influence Life on Land: -**

1. Weather and climate are the two factors which influence life on land.
2. Weather refers to short term fluctuations in temperature, humidity, cloud cover, wind and precipitation over periods of hours or days while climate refers to overall patterns of weather that prevail, from year to year even country to country in a particular region.

**SAHIWAL BOARD QUESTIONS**

1. Differentiate between Alpine and Boreal coniferous forest. (Sahiwal Board-2013-A)
2. Give the scientific names of any two animals of temperate deciduous forests. (Sahiwal Board-2013-A)
3. What type of plant life is found in Tundra? (Sahiwal Board-Old Scheme-2014-A)
4. Differentiate between Phytoplanktons and zooplanktons. (Sahiwal Board-New Scheme-2014-A)
5. What are kinds of coniferous forests and where are they located? (Sahiwal Board-New Scheme-2014-A)
6. What is limnetic zone? (Sahiwal Board-New Scheme-2015-A)
7. Give the names of four major ecosystem on land in Pakistan. (Sahiwal Board-New Scheme-2015-A)

**Answers****1. Differences between Alpine and Boreal Coniferous****Forest: -**

See Multan Board Answer No: 9

## 2. Scientific Names of Any Two Animals of Temperate

### Deciduous Forests: -

1. *Felis benagalensis* (leopard cat)
2. *Macaca mulato* (rhesus monkey)

### 3. Type of Plant Life in Tundra: -

1. Small perennial and herbs and shrubs are present in Tundra which produce in very short periods of favorable
2. The predominant plants are grasses, mosses, sedges and lichens (including reeinder moss). They grow on dense mat of peaty humus.
3. The grasses are found in better drained areas, while southern slopes also possess flowering herbs like *Aconita* and *Geranium*.

### 4. Differences between Phytolanktons and Zooplanktons: -

See Lahore Board Answer No: 1

### 5. A) Kinds of Coniferous Forests: -

Following are the kinds of coniferous forests:

1. Alpine Forests
2. Boreal Forests
3. Taiga

### B) Location of Coniferous Forests: -

1. Alpine Forests --- Located at high altitude
2. Boreal Forests --- Located at high latitude
3. Taig --- Evergreen coniferous forests of north. As they are located at high latitude, hence are also called Boreal Forests.

### 6. Limnetic Zone: -

See Gujranwala Board Answer No: 11

### 7. Names of Four Major Ecosystem on Land in Pakistan: -

See Exercise Chapter No: 26 Answer No: 5

C h a p t e r ---  
27

## MAN AND HIS ENVIRONMET

3 SQs

### I. From Exercise:-

#### Questions

1. What is ozone layer?
2. What do you mean by non-renewable resources?
3. What is difference between deforestation and afforestation?
4. What do you know about biodiversity?
5. What is water pollution?
6. Define green house effect.
7. What is acid rain?
8. What is algal bloom?

#### Answers

##### 1. Ozone Layer: -

1. It is layer of atmosphere extending from 10-50 kilometers above earth which contains ozone.
2. Ozone, in its pure form, is a bluish, explosive and

highly poisonous gas.

3. Each molecule of ozone gas is made up of three oxygen atoms bonded together.
4. Ozone layer filters ultraviolet (UV) radiations (rays) of sun and protects us from these harmful rays of the sun.

##### 2. Non-Renewable Resources: -

1. These are exhaustible resources.
2. These resources once consumed can not be replaced.
3. Some parts of the earth are rich in certain non-renewable resources and others are poor.
4. The demand for non-renewable resources is constantly increasing.
5. When non-renewable resources run out they will have to

be replaced by recycling or by using man made materials derived from plant products.

##### Examples: -

Fossil fuels (oil, coal and natural gas), metals and non-metallic minerals.

##### 3. Difference between Deforestation and Afforestation: -

| Deforestation                                                | Afforestation                                                                  |
|--------------------------------------------------------------|--------------------------------------------------------------------------------|
| 1. It is clearing of forests by natural causes or by humans. | 1. It is the establishment of new forests where no forests existed previously. |
| 2. It leads to desertification.                              | 2. It prevents desertification.                                                |

##### 4. Biodiversity: -

1. Biodiversity refers to the total number of different species within an ecosystem and the resulting complexity of interactions among them. Or At its simplest level, biodiversity is the variety of life on Earth, but it is a common practice to describe biodiversity in terms of the number of species among various groups of organisms. Or Biodiversity is the variety of living organism considered at three level, genetic diversity, species diversity and ecosystem diversity.
2. Tropical rain forests contain enormous biodiversity of species of animals and plants.

##### 5. Water Pollution: -

1. The term water pollution is referred to as any type of aquatic contamination.
2. Human activity is the main cause of water pollution.
3. Water bodies which are effected are canals, streams, lakes, rivers and even sea water.
4. The main sources of water pollution are:
  - a. Incompletely treated sewage
  - b. Oil
  - c. Detergent
  - d. Chemical pollutants from industries

##### 6. Green House Effect: -

1. The natural trapping of heat in the atmosphere resulting in global warming is called Green House Effect.
2. Green House is the man made house of glass sheet.

Light rays from the sun penetrate the glass of green house and then radiate as long wave radiations (i.e. infra red heat radiations). The glass does not permit these rays to escape outside and so that heat remains within the green house.

3. The Carbon Dioxide of atmosphere behaves like glass

sheet of green house. It absorbs the sun energy but does not allow it to escape outside, as a result of which the temperature of the atmosphere increases

now being termed as Global Warming. This increase in the

temperature is known as Green House Effect.

4. Green houses gases are those which prevent heat to escape from them.

**7. Acid Rain: -**

1. Acid rain is the rain that is acidic as a result of both sulphur and nitrogen oxides forming acids when they react with water in the atmosphere.

2. Power stations and other industrial units run by burning of fossil fuels and emit sulphur dioxide and nitrogen oxides into the air. In the atmosphere these gases combine with water vapors to form following acids.

**Water Vapors**

**Nitrogen dioxide**  $\xrightarrow{\text{Water Vapors}}$  **Nitric Acid + Nitrous Acid**

**Water Vapors**

**Sulphur dioxide**  $\xrightarrow{\text{Water Vapors}}$  **Sulphurous oxide + Sulphuric Acid**

Days later and thousands of kilometers away from the

source these acids return to the earth either dissolved in

rain (Acid rain) or as microscopic dry particles.

**8. Algal Bloom: -**

1. It is also called Eutrication.

2. It is the natural process of excessive enrichment of water with nutrients by which large amount of living organic matter grows in water. Vast quantities of algae feed and reproduce on these nutrients causing the

water to turn green with algal bloom. These algae are then decomposed by aerobic bacteria causing oxygen depletion.

2. Algal bloom occurs in fresh water (e.g. lakes) and in sea water.

3. It develops unpleasant color and smell in water.

**II) From Punjab Boards:-**

**LAHORE BOARD QUESTIONS**

1. Define green house effect. (Lahore Board-2008-

A)

2. Define pollution. (Lahore Board-2009-

A)

3. What is algal bloom? (Lahore Board-2009-

A)

4. Write the reasons for world population explosion. (Lahore Board-2010-

A)

5. Differentiate between deforestation and afforestation. (Lahore Board-2010-

A)

6. What are renewable resources and non renewable resources. (Lahore Board-2011-

A)

7. Write names of various types of pollution.

(Lahore Board-2011-

A)

8. Define soil. What are its basic constituents.

(Lahore Board-2011-

A)

9. Give main causes of water pollution.

(Lahore Board-Group-I-2012-

A)

10. Give importance of solid wastes.

(Lahore Board-Group-I-2012-

A)

11. Describe abuses of land.

(Lahore Board-Group-I-2012-

A)

14. Give the effects of ozone depletion on life.

(Lahore Board-Group-II-2012-

A)

15. Define green house effect.

(Lahore Board-Group-II-2012-

A)

16. Differentiate between health and disease.

(Lahore Board-Group-II-2012-

A)

17. What is Acid Rain? (Lahore Board-Group-I-2013-

A)

18. What are renewable resources? Give example.

(Lahore Board-Group-I-2013-

A)

19. Explain Deforestation and Afforestation.

(Lahore Board-Group-I-2013-

A)

20. What are solid wastes and how these can be used

as

source of energy? (Lahore Board-Group-II-2013-

A)

21. What do you mean by population explosion and

give its two causes. (Lahore Board-Group-II-2013-

A)

22. Write four ways for energy conservation.

(Lahore Board-Group-I-2014-

A)

23. Define population pressure. Give one example of

its

effect on ecosystem.

(Lahore Board-Group-I-2014-

A)

24. What are renewable resources? Give example.

(Lahore Board-Group-II-2014-

A)

25. Differentiate between deforestation and

afforestation. (Lahore Board-Group-II-2014-

A)

### **Answers**

**1. Green House Effect: -**

See Exercise Chapter No: 27 Answer No: 6

**2. Pollution: -**

1. The befouling of environment by anything produced by

humans which is or may be harmful to human life or

other living organisms is called Environmental Pollution. Or  
Pollution can be defined as any environmental change that adversely affects the lives and health of living organisms. Or  
Pollution is an undesirable change in the physical, chemical or biological characteristics of air, land, and water that may harmfully affect living organisms and natural resources.

2. Generally there are various kinds of material pollution such as pollution of air, water and land.

3. There are also other kinds of non-material pollution such as radiation pollution, noise pollution and thermal pollution.

3. **Algal Bloom: -**  
See Exercise Chapter No: 27 Answer No: 8

4. **Reasons for World Population Explosion: -**

1. Disease prevention medicine, public, personal and food hygiene.
2. Improved nutrition by efficient Agriculture.
3. Housing and living standards improved.
4. Child care, maternity, parent-craft and welfare services.

5. **Differences between Deforestation and Afforestation: -**  
See Exercise Chapter No: 27 Answer No: 3

6. **A) Renewable Resources: -**

1. Renewable Resources are the resources which are used again and again but are never depleted.
2. They are recycled again.
3. They are virtually in-exhaustible.

Examples: -  
Air, water, food, land, forests and wild life

**B) Non Renewable Resources: -**  
These are exhaustible resources and once consumed can not be replaced.  
Examples: -  
Fossil fuels (oil, coal and natural gas), metals and non-metallic minerals.

7. **Names of Various Types of Pollution: -**

1. Air or Atmospheric Pollution
2. Water Pollution
3. Soil Pollution
4. Radiation Pollution
5. Noise Pollution

8. **A) Soil: -**  
Soil can be defined as the upper layering of Earth's crust

**B) Basic Constituents: -**  
The basic constituents of soil are:

- a. Soil particles
- b. Soil air
- c. Inorganic Matter
- d. Soil organisms

9. **Main Causes of Water Pollution: -**

1. Sewage Incomplete Treatment: -

Sewage water contains harmful bacteria and poisonous chemicals. Certain bacteria cause diseases like typhoid and cholera when they get into human intestine. Untreated sewage must not be emptied into rivers.

2. Oil: -  
Oil pollution of sea has become a familiar event, to kill life in water, particularly, life dependent on aquatic producers and consumers of other levels.

3. Various detergents: -  
Various detergents also enter the water from houses and laundries to pollute with various harmful effects.

10. **Importance of Solid Wastes: -**

1. Solid wastes are called hazardous wastes because they contain substances they breed bacteria that cause human illness and sometimes even death
2. Certain kinds of solid waste material such as farm and animal manure, crop residues, and sewage can be converted into fuel called biogas or biomass.
3. A small part of solid waste is composed. After sorting out metals, glass and similar inorganic material, the rest of refuse is converted to a peat like organic fertilizer and soil conditioner.

11. **Abuses of Land: -**  
Land may be abused in many ways like erosion, poor agriculture practice, extensive grazing, leeching etc. Rapid urbanization is also a factor in disturbing the natural land condition. Fertilizers, insecticides, and pesticides are also polluting the soil. Or  
Land may be abused in many ways like:

a. Erosion: -  
Soil erosion means that soil is blown away by the wind or washed away by rain water. Erosion may occur for a number of reasons.

b. Poor agriculture practice: -  
If land is ploughed year after year and treated only with chemical fertilizers, the soil's structure may be destroyed and it becomes dry and sandy.

c. Extensive grazing: -  
If too many animals are kept on a pasture, they eat the grasses down almost to the roots, and their hooves trample the surface soil into a hard layer.

d. Leeching: -  
Fertilizers leave the ecosystem by being leached from the land and drained into the rivers.

e. Rapid urbanization: -  
It disturbs natural land conditions.

f. Fertilizers, pesticides and insecticides: -  
They also pollute the soil and inhibit process of soil formation and reduce the capacity of soil to maintain fertility.

14. **The effects of Ozone Depletion on Life: -**  
Ultraviolet rays (UV) reaching earth's surface, due to ozone depletion, cause skin cancer and cataracts in human. They can also affect crops, plants, trees and even marine plankton. Or



- Ozone depletion allows more ultraviolet rays to reach the surface of earth. Excessive exposure to UV radiation has following effects on life.
1. UV radiation causes mutation that can lead to melanoma, a type of skin cancer.
  2. UV radiation can make the lens of the eye develop cataracts (i.e. lens become cloudy).
  3. It adversely affects the immune system and our ability to resist infectious diseases.
  4. It may also damage crops and forests.
  5. It kills algae (phytoplankton) because it inhibits photosynthesis in these phytoanktons.
  6. It kills tiny shrimp-like animals (krill) that sustain oceanic life.

**15. Green House Effect: -**

See Exercise Chapter No: 27 Answer No: 6

**16. Differences between Health and Disease: -**

| Health                                                  | Disease                                                                                                                            |
|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| 1. It is the steady internal state of homeostasis.      | 1. It is the departure from normal or steady internal state of homeostasis through structural or functional disorders of the body. |
| 2. It is a condition of physical and mental well being. | 2. It is an abnormal condition in which an organ or part of an organ does not perform its normal function.                         |

**17. Acid Rain: -**

See Exercise Chapter No: 27 Answer No: 7

**18. A) Renewable Resources: -**

1. Renewable are such type resources which as we use again and again.
2. There is natural cycle to make renewable resources reusable, that is why they are called renewable resources.
3. They are inexhaustible resources.

**B) Examples: -**

Air, water, land, solar energy etc.

**19. A) Deforestation: -**

Clearance of vast areas of forest for procuring lumber, planting subsistence crops or grazing cattle is called Deforestation. Or  
It is defined as the temporary or permanent clearance of forests for agriculture or other uses. Or  
Deforestation means cutting down of trees for the conversion of a forest to non-forest land.

**B) Afforestation: -**

Afforestation is establishment of new forests where no forests existed previously. Or  
It means the establishment of new forests by planting on non-forest areas.

**20. A) Solid Wastes:-**

Trash, organic manure, plastic materials, cans, agriculture and industrial wastes all are solid wastes. Or  
Solid wastes include household trash, sewage

sludge, garbage, agricultural residues and industrial wastes.

**B) Solid Wastes Source of Energy: -**

Solid wastes can be converted by hydrogenation, pyrolysis (destructive distillation) or bioconversion into oil and gas.

**21. A) Population Explosion: -**

Increasing of human population with exponential rate

is known as Population Explosion.

**B) Two Causes of Population Explosion: -**

1. Decrease in infant mortality: -

Populations in developing world are growing, not because of an increase in the number of babies born per family, but because more babies are surviving to reach reproductive age.

2. Increase in life expectancy: -

An increase in the life expectancy due to better living conditions, education, better food and medicine is one of many causes of population explosion. The life expectancy is the average age to which a newborn baby can be expected to live.

**22. Four Ways for Energy Conservation: -**

1. Develop and use energy efficient machines, engines and manufacturing processes.
2. Reduce wastage by recycling.
3. Drive less, walk and use public transport more.
4. Switch off lights and electrical appliances when they are not in use.

**23. A) Population Pressure: -**

1. More people, more agriculture, more industrialization will put still more pressure on the environment. This is called population pressure.
2. As the human population increases, there is an increased demand for food. When humans need food, they convert natural ecosystem to artificially maintained agriculture useful to humans. If these agriculture ecosystems are mismanaged, the total productivity may fall below that of original ecosystem.

**B) One Example of Effect of Population Pressure on**

**Ecosystem: -**

The dust bowl of North America

**24. Renewable Resources with Example: -**

See Lahore Board Answer No: 18

**25. Differences between Deforestation and Afforestation: -**

See Exercise Chapter No: 27 Answer No: 3

**GUJRANWALA BOARD QUESTIONS**

1. Define soil. (Gujranwala Board-2008-A)
2. What do you mean by effluents? (Gujranwala Board-2008-A)
3. Why forests are called environmental buffer? (Gujranwala Board-2009-A)
4. What are renewable and non-renewable

- resources? (Gujranwala Board-2009-  
A)
5. Write the effects of bacteria in eutrophic lakes. (Gujranwala Board-2010-  
A)
6. What is stone cancer? Give its cause. (Gujranwala Board-2010-  
A)
7. Why are forests called environmental buffers? (Gujranwala Board-2010-  
A)
8. Define health and disease. (Gujranwala Board-2011-  
A)
9. Give two effects of acid rain. (Gujranwala Board-2011-  
A)
10. Mention any four ways in which we can save energy. (Gujranwala Board-2012-  
A)
11. Describe briefly renewable resources and non-renewable resources? (Gujranwala Board-2012-  
A)
12. Give the importance of ozone layer. (Gujranwala Board-2012-  
A)
13. What do you know about ozone layer? (Gujranwala Board-2013-  
A)
14. Give atleast four ways to conserve energy. (Gujranwala Board-2013-  
A)
15. What is green house effect? (Gujranwala Board-New Scheme-2014-  
A)
16. How energy can be produced from solid waste? (Gujranwala Board-New Scheme-2014-  
A)
17. What are renewable resources? (Gujranwala Board-New Scheme-2014-  
A)
18. Define demography. (Gujranwala Board-New Scheme-2014-  
A)
19. Define desertification. (Gujranwala Board-New Scheme-2014-  
A)
20. What is meant by fossil fuels? (Gujranwala Board-New Scheme-2015-  
A)
21. What is acid rain? (Gujranwala Board-New Scheme-2015-  
A)

## Answers

### 1. Soil: -

1. Soil can be defined as the upper layering of Earth's crust.
2. Soil is the accumulation of inorganic rock material and organic matter that is capable of supporting the growth of vegetation.
3. Soil is a mixture of mineral particles decaying organic

material, living organisms, air, water, which together support the growth of plants.

4. Soil mineral particles are mixture of following three types of particles:

- a. Sand particles--- they are largest particles
  - b. Silt particles have an intermediate size
  - c. Clay particles are smallest
5. Soil supports life on land and plants depend directly on soil to be anchored firmly.

6. It provides water, organic and inorganic nutrients to the plants.
6. Soil acts a reservoir for water.

### 2. Effluents: -

1. Chemical wastes from industry comprises substances called effluents.
2. Factories sometimes turn water pathways into open sewers by dumping oil, toxic chemical and other harmful liquids (called effluents) into them.
3. Effluents either kill the microorganisms that pollute the water or inhibit their growth. Or Industrial effluents are toxic chemicals that are actually agents of water pollution which originate in industrial operations.

### Examples: -

- Acid mine, drainage, surface erosion from strip mines, washing of herbicides and insecticides, radioactive fall out from atomic explosion and commercial accidents such as spills or rupture of chemical tanks.

### 3. Forests Called Environmental Buffer: -

Forests are called environmental buffer because they intercept heavy rainfall and release the water steadily and slowly to the soil beneath and to the streams and rivers that start in or flow through them. The tree roots hold the soil in place.

### 4. Renewable Resources and Non-Renewable Resources: -

See Lahore Board Answer No: 6

### 5. Effects of Bacteria in Eutrophic Lakes: -

1. Bacteria decompose algae developing unpleasant color and smell in eutrophic lake.
2. Bacteria in eutrophic lakes are aerobic which deplete water oxygen, causing death of aquatic animals through lack of oxygen.
3. Oxygen depletion also converts sulphates and nitrates into toxic material like hydrogen sulfide and ammonia.

### 6. A) Stone Cancer: -

Acid rain has also corrosive effect on building stones and may damage them with the passage of time. In fact is known as stone cancer.

### B) Cause of Stone Cancer: -

The cause of stone cancer is the sulfuric acid

in acid rain.

**7. Forests Called Environmental Buffers: -**

See Gujranwala Board Answer No: 3

**8. A) Health: -**

It is the steady internal state of homeostasis.

**B) Disease: -**

It refers to the departure from normal or steady internal

state of homeostasis to structural or functional disorders of the body.

**9. Two Effects of Acid Rain: -**

1. Acid water draining through the soil washes out essential nutrients such as calcium and potassium.
2. Stone monument like Taj Mahal are being eroded due to stone cancer by acid rains.

**10. Any Four Ways to Save Energy: -**

1. Minimize the use of air conditioner.
2. It has been estimated that about 75 % electricity is being wasted through the use of inefficient modern machines and appliances such as motors, heaters, air conditioners, refrigerator etc. So we should choose correct appliance for daily use. It will save electricity.
3. Reduce wastage by recycling.
4. Switch off lights and electrical appliances when they are not in use.

**11. A) Renewable Resources: -**

1. Air, water, food, land, forests, fish and wild life are renewable resources.
2. These are considered as renewable as they are never depleted. Natural cycles are constantly replacing these materials, while they are being utilized by living organisms.

**B) Non-Renewable Resources: -**

1. Non-renewable resources include various metal, non-metallic minerals and fossil fuels (coal, oil and natural gas).
2. These resources are exhaustable and cannot be reused or replaced if depleted or destroyed. They will be finished for ever.
3. Modern is using these resources extensively and they may be depleted very soon.

**12. Importance of Ozone Layer: -**

Ozone layer absorbs most of the ultraviolet (UV) rays of the sun so that fewer rays strike the earth. Hence it protects earth and its organism from the harmful effects of these rays.

**13. Ozone Layer: -**

See Exercise Chapter No: 7 Answer No: 1

**14. Four Ways to Conserve Energy: -**

See Lahore Board Answer No: 22

**15. Green House Effect: -**

The Earth's surface receives and absorbs radiant heat from the Sun. It re-radiates some of its heat from back into space. The Sun's radiation is mainly in the form of short wave length energy and penetrates our atmosphere

easily. The energy radiated back is in the form of long wavelengths (infrared or IR), much of which is absorbed by the atmosphere. The atmosphere acts like the glass in a green house. It lets in the light and heat from the sun but reduces the amount of heat which escapes. This is called green house effect.

**16. Energy Produced from Solid Waste: -**

1. Solid wastes can be converted into gas or oil by use of any the three scientific processes i.e. hydrogenation, pyrolysis (destructive distillation) or bioconversion.
- a. Hydrogenation and pyrolysis processes are similar to those used for conversion of coal into synthetic oil and gas. Fluidized-bed incinerators have been developed which burn solid wastes at high pressure.

It produces hot gases which can be used to generate heat.

It has been estimated that burning 400 tones municipal refuse (solid waste) 15,000 Kilowatt electricity can be produced.

- b. Bioconversion in simple terms is the digestion of organic wastes by bacteria. Methane gas is produced during this process. It can be used as a fuel. In Pakistan biogas plants are developed in villages to supply gas for domestic process.

**17. Renewable Resources: -**

See Lahore Board Answer No: 18

**18. Demography: -**

Demography is the statistical study of a population, such as its density, its distribution, and its rate of growth, which is dependent on such factors as its mortality pattern and age distribution. Or It is the science that deals with human population statistics such as size, distribution, age etc.

**19. Desertification: -**

1. It is the degradation of once fertile land into non-productive desert.
2. It is caused partly by soil erosion, deforestation, and overgrazing by domestic animals.

**20. Fossil Fuels: -**

Faisalabad Board Answer No: 7

**21. Acid Rain: -**

Sulphur dioxide and oxides of nitrogen are the product of coal, oil and natural gas burning. They react readily with oxygen and rainwater to form dilute sulphuric acid and nitric acid respectively. Rain containing these acids is known as acid rain.

**MULTAN BOARD QUESTIONS**

1. What is the effect of insecticides and herbicides on monocultures? (Multan Board-2008-A)
2. What are the consequences of population explosion?

- (Multan Board-2008-  
A)  
3. What is the importance of ozone layer?  
(Multan Board-2009-  
A)  
4. What is the importance of forests?  
(Multan Board-2009-  
S)  
5. Name two sources of Air Pollutant  
Chlorofluorocarbons (CFCs). (Multan Board-2009-  
S)  
6. Define soil and its constituents. (Multan Board-2010-  
A)  
7. How solid waste can be used for the Production of  
Energy? (Multan Board-2010-  
A)  
8. What is meant by environmental buffers?  
(Multan Board-2010-  
S)  
9. How can you conserve energy? (Multan Board-2010-  
S)  
10. What is ozone layer? Give its role.  
(Multan Board-2011-  
A)  
11. Differentiate between Deforestation and  
Reforestation.  
(Multan Board-2011-  
A)  
12. What are Industrial Effluents? Give their role?  
(Multan Board-2011-  
A)  
13. Define Demography. Give its importance.  
(Multan Board-2011-  
S)  
14. Wild life is a non-renewable resource. Comment.  
(Multan Board-2011-  
S)  
15. What is ozone layer depletion? (Multan Board-2011-  
S)  
16. What is Acid Rain? (Multan Board-2012-  
A)  
17. Differentiate between Deforestation and  
Afforestation.  
(Multan Board-2012-  
A)  
18. Define Soil. What are its Basic Constituents?  
(Multan Board-2012-  
A)  
19. What are algal blooms? Give their effects on aquatic  
life. (Multan Board-2012-  
S)  
20. Why forests are called environmental buffers?  
Explain.  
(Multan Board-2012-  
S)  
21. Differentiate between Renewable and Non-  
Renewable  
resources. (Multan Board-2013-  
A)  
22. Give four effects of Acid Rain. (Multan Board-2013-  
A)  
23. Differentiate between Health and diseases.

- (Multan Board-Old Scheme-2014-  
A)  
24. What vital roles do soil play?  
(Multan Board-Old Scheme-2014-  
A)  
25. What are main sources of water pollution?  
(Multan Board-Old Scheme-2014-  
A)  
26. Name some pathogenic and congenital diseases.  
(Multan Board-New Scheme-2014-  
A)  
27. Define Greenhouse Effect.  
(Multan Board-New Scheme-2014-  
A)  
28. What are industrial effluents?  
(Multan Board-New Scheme-2015-  
A)  
29. Differentiate between health and disease.  
(Multan Board-New Scheme-2015-  
A)

### Answers

#### 1. A) Effect of Insecticides on Monocultures: -

- Insecticides sprayed on monoculture crop or monoculture (crop of a single species grown on the same land year after year) kill not only harmful insects but the harmless and beneficial ones, such as the bees, which pollinate flowering plants, and ladybirds, which eat aphids.
- If seeds are dipped in the insecticides before planting, it prevents certain insects from attacking the seedling. But it also kills the birds which eat these seeds.
- Insecticides are also poisonous to humans. Many items of our food contain small amount of residual pesticides (insecticides). Some of these are suspected of causing cancer and other disorders. Peeling apples and potatoes removes most of the surface pesticide but there is not much we can do to reduce any residues on the inside.

#### B) Herbicides on Monocultures: -

- Herbicides are used to kill the plants that compete with the crop plant for root space, soil minerals and sunlight in order to maintain monoculture crop.

#### 2. Consequences of Population Explosion: -

- Over crowding, less living space more people; more crime, violence and social diseases.
- Starvation through lack of sufficient food.
- Destruction of the countryside, plants, animals and wildlife.
- Population will outstrip food supply.

#### 3. Importance of Ozone Layer: -

See Gujrawala Board Answer No: 12

#### 4. Importance of Forests: -

- They provide protection to man as well as many other organisms.

2. Fruits of forest trees are the source of food for number of animals.
3. Forests regulate the flow of water in the streams, prevent soil erosion and make the environment very pleasant.
4. Forests provide us with timber (construction wood) for houses, fire wood, medicine (herbal medicine, honey, wax) and many other products.

**5. Names of Two Sources of Air Pollutant Chlorofluorocarbons (CFCs): -**

1. Refrigerators
2. Air conditioners

**6. A) Soil**

Soil can be defined as the upper layering of Earth's crust Or

1. Soil can be defined as the upper layering of Earth's crust. Or  
Soil is defined as a mixture of mineral particles, decaying organic material, living organisms, air, and water. Or  
Soil is relatively a thin layer of Earth's crust that has been modified by natural actions of weather, wind, water and organisms.

**B) Constituents of Soil: -**

2. Four distinct components comprise soil:
  - a. Inorganic mineral particles --- Make up about 45 % of a typical soil. Inorganic mineral particles are mixture of following three types of particles:
    - i. Sand particles are largest particles.
    - ii. Silt particles have an intermediate size.
    - iii. Clay particles are smallest.
  - b. Organic matter ---- About 5 %  
Organic matter in the soil is composed of litter (dead leaves and branches), droppings (animal dungs), and dead remains of plants and animals and microorganisms in various stages of decomposition. Partly decayed organic matter is referred to as humus.
  - c. Pore spaces --- 50 %  
Soil has pore spaces of different sizes which roughly occupy roughly 50 % of soil volume and are filled with:
    - i. Water ----- About 25 %
    - ii. Air ---- About 25 %
    - d. Living organisms--Small plants play a major role in the formation of soil from bare rock. There are many different types of soil animals. Microorganisms also live in the soil.

**7. Solid Waste in Production of Energy:**

See Gujranwala Board Answer No: 16

**8. Environmental Buffers: -**

See Gujranwala Board Answer No: 3

**9. Conservation Energy: -**

See Lahore Board Answer No: 22 ▲

**10. A) Ozone layer: -**

It is layer of atmosphere extending from 10-50 kilometers above earth which contains ozone.

**B) Role of Ozone Layer: -**

Ozone layer protects life from the harmful ultraviolet rays of the sun.

**11. Differences between Deforestation and Reforestation: -**

| Deforestation                                                | Reforestation                                                                                                      |
|--------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| 1. It is clearing of forests by natural causes or by humans. | 1. It is the establishment of forests where previously forests existed but had been destroyed due to some reasons. |
| 2. It leads to desertification.                              | 2. It prevents desertification.                                                                                    |

**12. A) Industrial Effluents: -**

The chemical wastes from industry comprises substances called effluents.

**B) Role of Industrial Effluent: -**

They either kill the microorganisms that pollute the water or inhibit their growth.

**13. A) Demography: -**

Demography is the study of human populations and things that affect them. Or

Demography is the statistical study of populations and their changes through time.

**B) Importance of Demography: -**

1. Density of a population is calculated through demography.
2. Rate of growth of a population is determined by demography.

**14. Wild life a Non-Renewable Resource:**

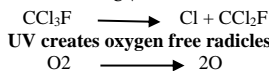
Wild life is a Renewable Resource but by tempering with the natural environment it has become Non-Renewable Resource. Or  
Wild life is a renewable resource but it can become non-renewable under extreme conditions of intervention.

**15. Ozone Layer Depletion: -**

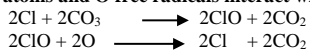
1. The latest studies of ozone layer reveals that ozone is depleting.
2. The decline in the thickness of ozone layer is caused by increasing level of chlorofluorocarbons (CFCs) which contains chlorine, fluorine and carbon. These gases are produced from the air conditioners in our homes, offices, vehicles and operating refrigerators. As CFCs rise to the atmosphere, ultraviolet rays cause chlorine to release. The chlorine release destroys the ozone molecule in the ozone layer. Due to this ozone layer is becoming thinner and thinner.
3. The level of ozone in the ozone layer over the Antarctica has fallen drastically and has led to a hole.
4. The ozone layer has also been found to decrease over arctic region. Or
1. The latest studies that ozone layer reveals that ozone is rapidly depleting.
2. The ozone thinning appeared for the first time in 1975 above Antarctic.
3. A slight thinning in the ozone layer over Antarctica forms naturally for a few months (spring) each year.
4. In 1985 scientists observed a greater thinning than usual. This increased thinning, which begins each September, is commonly referred to as the ozone

- hole. There ozone level decreases as much as 67% each year.
5. In addition, world wide level of ozone layer have been falling for several decades.
6. According to new research, since the 1970 ozone levels over Europe and North America have dropped about almost 10%.
7. The decline in the thickness of ozone layer is caused by increasing level of chlorofluorocarbons (CFCs) which contains chlorine, fluorine and carbon. The chlorine from CFCs reacts with ozone and reduces its concentration in the ozone layer in the following way:

**UV radiations causes CFCs to release Cl atoms:**



**Cl atoms and O free radicals interact with ozone:**



**Net reactions:**  $2\text{O}_3 \longrightarrow 3\text{O}_2$

8. A single chlorine atom can react with ultraviolet rays and destroy as well as many as one million ozone molecules.

#### 16. Acid Rain: -

See Exercise Chapter No: 27 Answer No: 7

#### 17. Differences between Deforestation and Afforestation: -

See Exercise Chapter No: 27 Answer No: 27

#### 18. Soil and its Basic Constituents: -

See Lahore Board Answer No: 8

#### 19. A) Algal Blooms: -

When nitrates and phosphates from farmland and sewage escape into water, they cause excessive growth of microscopic green autotrophs (algae). This is called algal bloom. As there are not enough microscopic animals in the water to eat microscopic algae, as a result they die and are broken down bacteria which use up oxygen. Thus algal bloom may result in a serious oxygen shortage in the water.

#### B) Effects of Algal Bloom On Aquatic Life: -

Water becomes deoxygenated and can no longer support animal life. Fishes and other organisms die of suffocation.

#### 20. Forests Called Environmental Buffers: -

See Gujranwala Board Answer No:3

#### 21. Differences between Renewable and Non-Renewable Resources: -

| Renewable Resources                                      | Non-Renewable Resources                                                    |
|----------------------------------------------------------|----------------------------------------------------------------------------|
| 1. They are never depleted. They are recycled in nature. | 1. They can not be replaced once their sources have been totally depleted. |
| 2. They are inexhaustible.                               | 2. They are exhaustible.                                                   |

- |                                                                                                    |                                                     |
|----------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| 3. They include various metals, non-metallic minerals and fossil fuels (coal, oil and natural gas) | 3. They include air, water food, land, forests etc. |
|----------------------------------------------------------------------------------------------------|-----------------------------------------------------|

#### 22. Four Effects of Acid Rain: -

1. Acid rain damages life in lakes and forests.
2. Acid water draining through the soil washes out essential nutrients such as calcium and potassium.
3. It also kills decomposers and microorganisms.
4. Plants poisoned and deprived of nutrients become weak and vulnerable to infection and insect attack.

#### 23. Differences between Health and Diseases: -

See Lahore Board Answer No: 16

#### 24. Roles of Soil: -

1. It supports life on land and plants depend directly on soil to be anchored firmly.
2. Soil provides essential nutrient minerals for plants.
3. It also provides pore spaces for water and air.
4. Soil acts a reservoir for water.

#### 25. Main Sources of Water Pollution: -

Main sources of water pollution are:

1. Untreated Sewage emptying into rivers
2. Wastes of industries (acids, alkalies, dyes and other chemicals) deposited in nearby water bodies
3. Hot water released from industry cooling plants into water bodies
4. Heavy metals (lead, mercury, arsenic, cadmium etc) released from industries into water bodies
5. Pesticides and fertilizers entering into water bodies with the rain water flow
6. Various detergents from houses and laundries entering into water bodies

#### 26. Names of Some Pathogenic and Congenital Diseases: -

##### a. Pathogenic Diseases: -

1. Diphtheria
2. Malaria
3. Cholera
4. AIDS
5. Small pox
6. Tuberculosis

##### b. Congenital Diseases: -

1. Hemophilia
2. Down's syndrome
3. Turner's syndrome

#### 27. Greenhouse Effect: -

1. Reradiations of solar heat toward the Earth is called Green House Effect. Or

It is the natural global warming of Earth's

atmosphere

caused by presence of carbon dioxide and other gases

that trap sun's radiation.

2. It is caused by trace green house gases such as carbon

dioxide, methane, ozone and nitrous oxide in the atmosphere.

3. These greenhouse gases allow the sun's energy to penetrate but do not allow a much of it to escape as heat.

4. Due to green house effect:

a. Global average sea level is raising.

- b. Precipitation pattern is changing.
- c. The ranges of organisms are changing.
- d. Human health in developing countries is being indirectly affected.
- e. Agriculture is being effected.

**28. Industrial Effulents: -**

See Gujranwala Board Answer No: 2

**29. Differences between Health and Disease: -**

See Lahore Board Answer No: 6

**BAHAWALPUR BOARD QUESTIONS**

1. What is acid rain? (Bahawalpur Board-2008-A)
2. Define Non-renewable resources. (Bahawalpur Board-2008-A)
3. Name two air pollutants. (Bahawalpur Board-2009-A)
4. What are the causes of Green House Effect? (Bahawalpur Board-2009-A)
5. What is Demography? (Bahawalpur Board-2009-A)
6. What are Effulents? (Bahawalpur Board-2009-A)
7. What is meant by Stone Cancer? (Bahawalpur Board-2009-A)
8. What are the main sources of Water Pollution? (Bahawalpur Board-2010-A)
9. Explain the concept of Geothermal Energy. (Bahawalpur Board-2010-A)
10. Define soil and give its role. (Bahawalpur Board-2011-A)
11. Explain Population Explosion. (Bahawalpur Board-2011-A)
12. Briefly Discuss Eutrophication. (Bahawalpur Board-2011-A)
13. Define Eutrophication (Algal Bloom). (Bahawalpur Board-2012-A)
14. Give three importances of forest. (Bahawalpur Board-2012-A)
15. Define Green House Effect. (Bahawalpur Board-2012-A)
16. Describe about fossil fuels. (Bahawalpur Board-2013-A)
17. What is Tidal Power and its role? (Bahawalpur Board-2013-A)
18. Define soil and give its main components. (Bahawalpur Board-New Scheme-2014-A)
19. Differentiate between Deforestation and Afforestation. (Bahawalpur Board-New Scheme-2014-A)

20. What is Biodiversity? (Bahawalpur Board-New Scheme-2015-A)
21. What are Environmental Buffers? (Bahawalpur Board-New Scheme-2015-A)

**Answers****1. Acid Rain: -**

See Exercise Chapter No: 27 Answer No: 7

**2. Non-Renewable Resources: -**

See Exercise Chapter No: 27 Answer No: 2

**3. Two Air Pollutants: -**

1. Sulfur dioxide
2. Chlorofluorocarbons

**4. Causes of Green House Effect: -**

Over urbanization, deforestation and industrialization are the causes of Green House Effect. Or  
The main cause of green house effect is the increase

in the carbon dioxide concentrations in the atmosphere that mainly result from two types of human activity:

- a. Burning of fossil fuels
- b. Deforestation

**5. Demography: -**

See Multan Board Answer No: 13 (A)

**6. Effulents: -**

1. Toxic chemicals in the water originated in industrial operations are called Industrial Effulents.
2. Factories sometimes turn water ways into open sewers by dumping oil, toxic chemical and other harmful liquids into them.
3. Effulents either kill the organisms that pollute the water or inhibit their growth.

**7. Stone Cancer: -**

See Gujranwala Board Answer No: 6 (A)

**8. Main Sources of Water Pollution: -**

Main causes of water pollution are:

**a. Sewage Incomplete Treatment: -**

Sewage may contain feces contaminated with pathogens of many diseases such as typhoid and cholera. If sewage is not treated and these get into water, many people may get the infection by drinking

contaminated water. For this reason, among others, untreated sewage must not be emptied into rivers.

**b. Oil: -**

Oil pollution of the sea has become a familiar event

to kill life in water, particularly life dependent on aquatic

producers and consumers of other levels.

**c. Detergents: -**

Various detergents such as nitrates and phosphates from houses, laundries, farmland and sewage escape into water and pollute it. These detergents may cause excessive growth of microscopic green algae

resulting in eutrophication and consequently oxygen depletion in the water.

**d. Chemical pollutants: -**

Many industrial processes produce poisonous waste products. If these chemicals are released into river, they poison the animals and plants and could poison humans who drink the water.

**9. Concept of Geothermal Energy: -**

1. The natural heat energy rapped underground is called geothermal enrgy.
2. Valcanos, ho springs and gysers allow the escape of hot substance from the inside of the earh.
3. Hot waer or steam carrying geothermal energy comes up to the surface in some parts of the world such as NewZealand and Ice Land.
4. Geothermal energy is free and can last for a long time.
5. Sites of geothermal energy are usually located for away from from their consumers. His makes the harnessing of geothermal energy at these sites impracticable.
6. Harmful substances such as boron and oxides of sulfur are also released together with the hot water and sream.

**10. A) Soil: -**

Soil can be defined as the upper layering of Earth's crust.

**B) Role of Soil: -**

1. It supports life on land and plants depend directly on soil to be anchored firmly.
2. It provides water, organic and inorganic nutrients to the plants.

**11. Population Explosion: -**

Increasing of human population with exponential rate is known as Population Explosion.  
Example: -  
Human population of Pakistan was 3.5 million at the time of independence in 1947. It has now increased to 150-160 million people in year 2000. About 20 years ago the human population was increasing with doubling every 35 years.

**12. Eutrophication: -**

1. Accumulation of nitrates and phosphates in the aquatic system leads to eutrophication.
2. Eutrophication involves rapid, excessive growth of microscopic aquatic autotrophs, which then die and decay; their decomsition lowers oxygen levels in the aquatic environment.

**13. Eutrophication (Algal Bloom): -**

See Bahawalpur Board Answer No: 12

**14. Three Importances of Forest: -**

1. The tropical rain forests in particular, forests in general, are centres of biodiversity, many of the world's species exist in these ecosystems. It is estimated that at least 50 percent of the world's species live in tropical rain forests.
2. Forests have a much wider ecological role in stabilizing the Earth's climate especially in the

circulation of carbon dioxide, oxygen and water and important in preventing soil erosion.

3. Forests regulate the flow of water in the streams, prevent soil erosion and make the environment very pleasant.

**15. Green House Effect: -**

1. Natural trapping of heat in the atmosphere is called the green house effect.
2. Carbon dioxide and other gases that absorb heat (infrared radition) are known as greenhouse gases.
3. The natural greenhouse effect is beneficial. If it were not there, the Earth's surface temperature could be as low as  $-180^{\circ}\text{C}$ .
4. But due to over urbanization, deforestation and industrialization, the concentration of carob dioxide has increased tremendously in the atmosphere which is gradually increasing temperature of earth, now being called global warming.
5. Global warming may lead to rapid melting of ice caps and glaciers, bringing floods and changing the path of major air and ocean currents, drastically affecting the global weather conditions.

**16. Fossil Fuels: -**

1. Fossil fuels are combustible deposits in the earth's crust that are composed of prehistoric organisms that existed million of years ago.
2. Fossil fuels are non-renewable resources i.e. earth has finite or limited supply of them, thus these resources must be used properly.  
Example: -  
Oil, Natural gas and Coal

**17. A) Tidal Power: -**

1. Tides are mainly caused by he gravitational pull of the moon and of a lesser extent by the gravitational pull of the sun on water in seas and oceans. The changing water derives toward or away from the land.

**B) Role of Tidal Power: -**

The difference in height of the water at high and low tides is made use of in a tidal power station to generate electricity. The tidal power station consists of a long barrier called a tidal barrage. The flow of water of water across the barrage turns its terbines, which inturn derive the generators to produce electricity.  
Or  
Tidal power can be used for large scale electricity. Direct use of tidal waves for this purpose is not feasible. A dam called tidal power station can be built on a bay that is filled and emptied at high and low tides. Such a damed bay (tidal power station) function like a regular hydroelectric power plant and the force of falling water can be used to derive turbine to



generate electricity.

**18. Soil and its Main Components: -**

See Lahore Board Answer No: 8

**19. Differences between Deforestation and Afforestation: -**

See Exercise Chapter No: 27 Answer No: 27

**20. Biodiversity -**

See Exercise Chapter No: 27 Answer No: 4

**21. Environmental Buffers: -**

1. Forests are called environmental buffer.
2. Forests intercept heavy rainfall and release the water steadily and slowly to the soil beneath and to the streams and rivers that start in or flow through them. The tree roots hold the soil in place.

**FAISALABAD BOARD QUESTIONS**

1. What is ozone layer. (Faisalabad Board-2008-A)
2. What is acid rain? (Faisalabad Board-2008-A)
3. List the effects of acid rain. (Faisalabad Board-2009-A)
4. Define soil and give its basic constituents. (Faisalabad Board-2010-A)
5. Differentiate between Afforestation and reforestation. (Faisalabad Board-2010-A)
6. What is ozone layer. (Faisalabad Board-2011-A)
7. Write shortly about fossil fuels. (Faisalabad Board-2011-A)
8. What is deforestation? (Faisalabad Board-2011-A)
9. Define pollution and pollutants. (Faisalabad Board-2012-A)
10. Give any four points to conserve energy. (Faisalabad Board-2012-A)
11. Define desertification. (Faisalabad Board-2013-A)
12. Define renewable resources. Give two examples. (Faisalabad Board-2013-A)
13. What is ozone? (Faisalabad Board-2013-A)
14. What are environmental buffers? (Faisalabad Board-Old Scheme-2014-A)
15. Define green house effect. (Faisalabad Board-Old Scheme-2014-A)
16. What is soil? (Faisalabad Board-Old Scheme-2014-A)
17. What is green house effect? (Faisalabad Board-New Scheme-2014-A)
18. How energy can be produced from solid wastes? (Faisalabad Board-New Scheme-2014-A)
19. What is greenhouse effect?

(Faisalabad Board-New Scheme-

2015)

20. Differentiate between renewable and non-renewable resources. (Faisalabad Board-New Scheme-2015)

**Answers**

**1. Ozone Layer: -**

See Exercise Chapter No: 7 Answer No: 1

**2. Acid Rain: -**

When rain falls through polluted air, it comes across chemicals such as oxides of sulphur and nitrogen. These chemicals interact with water vapors in the presence of sunlight to form sulphuric acid and nitric acid. These acids remain as vapors at high temperatures. As temperature falls, acids begin to condense in liquid form and mix with rain or snow,

on

the way to the earth. This makes rain acidic (called Acid rain) with pH range of 3 to 6.

**3. Effects of Acid Rain: -**

1. Acid rain damages life in lakes and forests.
2. Acid water draining through the soil washes out essential nutrients such as calcium and potassium.
3. It also kills decomposers and microorganisms.
4. Plants poisoned and deprived of nutrients become weak and vulnerable to infection and insect attack.
5. Stone monuments like Taj Mahal are being eroded due to stone cancer by acid rains.

**4. Soil and its Basic Constituents: -**

See Lahore Board Answer No: 8

**5. Differences between Afforestation and Reforestation: -**

See Multan Board Answer No: 11

**6. Ozone Layer: -**

See Exercise Chapter No: 7 Answer No: 1

**7. Fossil Fuels: -**

1. Coal, oil (petroleum) and gas are collectively called fossil fuels.
2. They are called fossil fuels because they are remains of plants and animals that lived million years ago and later due to global environmental changes became buried and fossilized in deeper layers of earth and sea.

3. They fulfil our 95 % of our daily energy requirements.

4. Pakistan has reservoirs for gas, oil, and coal.

Extensive

drilling for oil is being carried out in various regions

of

Pakistan.

5. Fossil fuels are present in the earth in fixed and limited

quantities and since their supplies are non-renewable, they will exhaust sooner and later.

**8. Deforestation: -**

1. It is clearing of forests by natural causes or by humans.

Or

It is the cutting down of trees of forests for agriculture

or other uses. Or

- Clearance of vast areas of forest for procuring lumber, planting subsistence crops or grazing cattle is called deforestation.
- Large areas of forests have been cleaned for agriculture, factories, roads, rail tracks and mining. Human cut trees for getting wood (lumber) which is the used for making structures and for heat production.
  - When forests are removed, this source of rain is also removed. Cloud cover is reduced and the local climate changes quite dramatically. The temperature range from day to night is more extreme i.e., the difference between day and night temperature increases considerably, and the rainfall diminishes.
  - Thus affects of deforestation include floods, drought, landslides, soil erosion and global warming.

Or

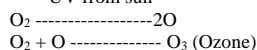
- Deforestation means cutting down of trees for the conversion of a forest to non-forest land.
- Deforestation has following effects:
  - Soil Erosion during heavy rain fall
  - Loss of essential nutrients into the streams and river during heavy rain fall.
  - Loss of amount of water in the soil and moisture in the atmosphere
  - Reduction in the rain fall due to decreased transpiration and less formation of clouds
  - Silting up of lakes and rivers
  - Storage of silted water in the dams and thus their reduction of water storage capacity
  - The loss for ever of thousand of species of animals and plants driving many of them to verge of extinction
- A) Pollution: -**  
It is any environmental change that adversely affects the lives and health of living organisms.
- B) Pollutants: -**  
The substances which harms the living organisms are called pollutants.
- 10. Four Points to Conserve Energy: -**  
See Lahore Board Answer No: 22
- 11. Desertification: -**
  - Desrtification is the degradation of once-fertile land into nonproductive desert.
  - It is caused partly by soil erosion, deforestation, and overgrazing by domestic animals.
- 12. A) Renewable Resources: -**  
Renwable resources are such type of resources which can be used again and again and never be depleted.
- B) Two Examples: -**
  - Air --- A several kilometers thick blanket of atmosphere surrounding the earth which consists of nitrogen (78%), oxygen (20%), carbon dioxide (0.03%) and noble gases.
  - Water --- About 70% of earth surface is covered with water. It is als a component of soil and air.
- 13. Ozone: -**

- Ozone, in its pure form, is a bluish, explosive and highly poisonous gas.
- Each molecule of ozone gas is made up of three oxygen atoms bonded together.
- Ozone is present throughout the atmosphere but reaches a peak at about 25 km (10-50 km) above the earth, where it forms a layer called ozone layer.

Ozone layer protects life from the harmful ultraviolet rays of the sun.

- Ozone is formed high up in the atmosphere where most ultraviolet light is present. Ultraviolet radiation from the sun splits oxygen molecule ( $O_2$ ) into two oxygen atoms ( $2O$ ). The resulting oxygen atoms combine with other oxygen molecules to produce ozone ( $O_3$ )

UV from sun



#### 14. Environmental Buffers: -

See Gujranwala Board Answer No:3

#### 15. Green House Effect: -

See Exercise Chapter No: 27 Answer No: 6

#### 16. Soil: -

See Gujranwala Board Answer No: 1

#### 17. Green House Effect: -

See Exercise Chapter No: 27 Answer No: 6

#### 18. Energy Produced from Solid Wastes:

See Gujranwala Board Answer No: 16

#### 19. Greenhouse Effect: -

See Exercise Chapter No: 27 Answer No: 6

#### 20. Differences between Renewable and Non-Renewable Resources: -

See Multan Board Answer No: 21

### RAWALPINDI BOARD QUESTIONS

- What are the main sources of water pollution?  
(Rawalpindi Board-2011-  
A)
- Define Biodiversity and Forest.  
(Rawalpindi Board-2011-  
A)
- Differentiate between renewable and non-renewable resources.  
(Rawalpindi Board-2011-  
A)
- Define hydroelectric power.  
(Rawalpindi Board-2012-  
A)
- Define geothermal energy.  
(Rawalpindi Board-2012-  
A)
- Write down three ways of energy conservation.  
(Rawalpindi Board-2013-  
A)
- Give four main importance of forest.  
(Rawalpindi Board-2013-  
A)
- Give impact of mismanaged agricultural Ecosystem.  
(Rawalpindi Board-New Pattern-2014-  
A)
- Descriminate between normal health and disease.

(Rawalpindi Board-New Pattern-2015-

A)

10. What is industrial effluent? Give its impact.

(Rawalpindi Board-New Pattern-2015-

A)

**Answers****1. Main Sources of Water Pollution: -**

See Multan Board Answer No: 25

**2. A) Biodiversity: -**

Biodiversity refers to the total number of different species with an ecosystem and resulting complexity

of

interactions among them.

**B) Forest: -**

Forest is a large area covered chiefly with trees and undergrowth. Or

Forest is a large area with thick growth of trees and bushes.

**3. Differences between Renewable and Non-renewable Resources: -**

See Multan Board Answer No: 21

**4. Hydroelectric Power: -**

1 The kinetic energy of falling water is harnessed o turn

turbines fixed at the base of dams. The turning turbines

will then drive generators to produce electricity

which

is known as hydroelectric power or electricity.

2. It is the cheapest and non-pollutant source of energy,

which man exploit more for its benefit and for

keeping

environment safe.

**5. Geothermal Energy: -**

1. Heat produced by radio-active material deep beneath the surface of earth is called Geothermal Energy which is trapped in the earth (underground)

2. Valcanos, hot spring and geysers are the sources of Geothermal Energy.

3. Hot water or steam carrying geothermal energy comes up to the surface in some parts of the world such as New Zealand and Ice Land

4. It is non-renewable resource.

**6. Three Ways of Energy Conservation:**

1. Minimize the use of air conditioner.

2. Reduce wastage by recycling.

3. Switch off lights and electrical appliances when they are not in use.

**7. Four Main Importance of Forests: -**

1. Forests support considerable biodiversity.

2. Forests extract carbon dioxide and pollutants from the

air, thus contributing to biosphere stability.

3. Forests are also valued for their aesthetic beauty and tourist attraction.

4. Forests provide the source of rain which comes from the transpiration of the trees themselves. The clouds which form from this transpired water help to reflect sunlight and so keep the region relatively cool and humid.

**8. Impact of Mismanaged Agricultural Ecosystem: -**

If land is ploughed year after year and treated with

only chemical fertilizers, soil structure may be destroyed and it may become dry and sandy. In

strong

winds it can be blown away as dust leading to the formation of dust bowls.

**9. Discrimination between Normal Health and Disease: -**

See Lahore Board Answer No: 16

**10. A) Industrial Effluent: -**

1. Toxic chemicals in the water originated in industrial operations are called Industrial Effluents.

2. Factories sometimes turn water ways into open sewers

by dumping oil, toxic chemical and other harmful liquids into them.

**B) Impact of Industrial Effluent: -**

Effluents either kill the organisms that pollute the water or inhibit their growth.

**SARGODHA BOARD QUESTIONS**

1. Explain eutricification. (Sargodha Board-2010-

A)

2. What is acid rain? Give its two effects.

(Sargodha Board-2010-

A)

3. Why the fossil fuels have been named so?

(Sargodha Board-2010-

A)

4. What are fossil fuels? Give an example.

(Sargodha Board-2011-

A)

5. Write main types of pollution.

(Sargodha Board-2011-

A)

6. How solid wastes can be used for the production of energy?

(Sargodha Board-2011-

A)

7. Write a note on Eutricification.

(Sargodha Board-2012-

A)

8. How does renewable resources differ from non-renewable resources?

(Sargodha Board-2012-

A)

9. What are the renewable resources? Give examples.

(Sargodha Board-2013-

A)

10. Write down the role of forest on the climate?

(Sargodha Board-2013-

A)

11. What is Nuclear Energy?

(Sargodha Board-New Scheme-2014-

A)

12. What do you mean by population pressure?

(Sargodha Board-New Scheme-2014-

A)

**Answers****1. Eutricification: -**

See Bahawalpur Board Answer No: 12

**2. A) Acid Rain: -**

Acid rain is a type of air pollution in which sulphuric acid and nitric acids produced by human activity falls

to the ground.

2. Acid rain is produced when sulfur dioxide and nitrogen dioxide, emitted in the air during the burning of fossil fuels, combine with water vapors in the atmosphere.

**B) Two Effects of Acid Rain: -**

1. Acid rain increases acidity (pH value) of the streams and thus may kill the many animal present there. It also

destroys the agriculture land and causes damage to crops and plants.

2. Sulphuric acid in acid rain destroys man made structures, metals and statues of archeological importance. Taj Mahal, for example, is being eroded due to stone cancer by acid rains.

**3. Fossil Fuels Named So: -**

Fossil fuels are named so because they are remains of plants and animals that lived millions of year ago and later due to global environmental changes became buried and fossilized in deeper layers of earth and sea.

**4. A) Fossil Fuels: -**

1. Fossil fuels got accumulated over a period of hundreds

of millions of plant and animal material being separated from the energy of the biosphere.

**B) An Example: -**

Coal is a form of sedimentary rock derived from the unoxidized carbon of plant tissues.

**5. Main Types of Pollution: -**

1. Air pollution or atmospheric pollution

2. Water pollution

3. Soil pollution

4. Radiation pollution

5. Noise pollution

**6. Solid Wastes in Production of Energy:**

Certain kinds of solid waste material such as farm and

animal manure, crop residues, and sewage can be converted into fuel, these are called biogas or biomass. The biomass material must first be

subjected

to special processes. The combination of certain organic wastes with hydrogen under high

temperature

and pressure converts the wastes into fuels. This process, that produces Methane and Ethane, is called hydrogasification. Biogas plants are being utilized on small scale in Pakistan and third world countries.

**7. Note on Eutrication: -**

See Exercise Chapter No: 27 Answer No: 8

**8. Renewable Resources Different from Non-renewable Resources: -**

See Multan Board Answer No: 21

**9. A) Renewable Resources: -**

1. Renewable resources are those that can be replenished

by either physical or biological means.

2. The important characteristic of renewable resources is

that they can be expected to remain available for ever,

if consumed in a sustained manner.

3. Tempering with the natural environment and pollution

can also endanger the continued existence and availability of renewable resources.

**B) Examples: -**

Air, water, soil, wild life, forests etc.

**10. Role of Forest on the Climate: -**

Forests have a much wider ecological role in stabilizing the Earth's climate especially in the circulation of carbon dioxide, oxygen and water.

a. Forests extract carbon dioxide and pollutants from the

air, thus contributing to biosphere stability.

b. Forests provide the source of rain which comes from the transpiration of the trees themselves. The clouds which form from this transpired water help to reflect sunlight and so keep the region relatively cool and humid.

**11. Nuclear Energy: -**

1. Nuclear energy is obtained from nuclear fuels by nuclear fission.

2. In nuclear power station, large amount of heat is generated by nuclear fission, which takes place in a nuclear reactor.

The heat energy is then used to convert water into steam, which drives steam turbines for generating electricity.

3. Nuclear station does not produce gases which pollute air, however it can last only for 30 years and strict safety measures have to be taken to avoid radiation pollution. Or

1. Splitting of the nucleus of a radioactive atom releases

tremendous amount of energy, called as nuclear or atomic energy.

2. This process of splitting of atom is known as fission.

3. Nuclear energy has been used by scientists to generate

electricity in nuclear reactors.

4. Nuclear fission reaction is the basis for running Nuclear Power Plant.

5. Uranium 235 is the primary nuclear fuel used in the present day reactors. It is mined from common rocks.

6. Nuclear energy is virtually inexhaustible source of energy.

**12. Population Pressure: -**

See Lahore Board Answer No: 23

**DERA GHAZI KHAN BOARD QUESTIONS**

1. What is eutrication? (D.G.K. Board-2009-A)

2. Explain green house effect. (D.G.K. Board-2009-A)

3. What are fossil fuels? (D.G.K. Board-2009-A)

4. How can you achieve better living conditions? (D.G.K. Board-2010-A)

5. Briefly discuss solid wastes, how they can be useful? (D.G.K. Board-2010-A)

6. Define Eutrication. (D.G.K. Board-2011-A)

7. What is meant by geothermal energy? Explain.  
(D.G.K. Board-2011-A)
8. Give two causes of water pollution.  
(D.G.K. Board-2011-A)
9. Define wild life. (D.G.K. Board-Group-I-2012-A)
10. Define Eutrication. (D.G.K. Board-Group-I-2012-A)
11. Explain briefly fossil fuels.  
(D.G.K. Board-Group-II-2012-A)
10. Differentiate between Aforestation and Reforestation.  
(D.G.K. Board-Group-II-2012-A)
11. Enlist the effects of Acid rain.  
(D.G.K. Board-Group-I-2013-A)
12. What is the importance of Ozone layer?  
(D.G.K. Board-Group-I-2013-A)
13. Define Biodiversity. D.G.K. Board-Group-II-2013-A)
14. Define Eutrication. (D.G.K. Board-Group-II-2013-A)
15. Define water pollution.  
(D.G.K. Board-New Scheme-Group-I-2014-A)
16. What is Eutrication.  
(D.G.K. Board-New Scheme-Group-I-2014-A)
17. What is solid waste? How energy can be obtained from solid waste?  
(D.G.K. Board-New Scheme-Group-II-2014-A)
18. What do you know about Hydroelectric Power?  
(D.G.K. Board-New Scheme-Group-II-2014-A)
19. What is stone cancer? Give its cause?  
(D.G.K. Board-New Scheme-Group-I-2015-A)
20. What is difference between afforestation and reforestation.  
(D.G.K. Board-New Scheme-Group-I-2015-A)
21. Define eutrication.  
(D.G.K. Board-New Scheme-Group-II-2015-A)
22. Give effects of Mismanaged Agriculture Ecosystem.  
(D.G.K. Board-New Scheme-Group-II-2015-A)

## Answers

### 1. Eutrication: -

It is the enrichment of water with inorganic nutrients which promotes the growth of algae leading to increase in the number of the decomposers and depletion of oxygen.

### 2. Greenhouse Effect: -

The term Greenhouse Effect refers to the phenomenon in which certain gases (called greenhouse gases) trap heat in the atmosphere. These gases act like the glass in a greenhouse, which does not allow the inner heat to escape. When sunlight reaches the surface of earth, much of its energy is transformed into heat energy. The earth surface this heat energy towards space as the infrared radiation. The greenhouse gases trap infrared radiation back to earth. Carbon dioxide, methane, and nitrous oxides are important greenhouse gases. Since 1800, the amount of carbon dioxide in atmosphere has increased 30 %. The amount of methane has more than doubled and the amount of nitrous oxide has increased about 8 %.

### 3. Fossil Fuels: -

See Faisalabad Board Answer No: 7

### 4. Achieving Better Living Conditions: -

You can achieve better living conditions by education, better food and medicine.

### 5. A) Solid Wastes: -

See Lahore Board Answer No: 20

### B) How Solid Wastes can be Useful: -

1. Solid wastes are being compacted under high pressure before disposing them off below ground. Some such low-laying areas can be converted into useful sites like play ground, industrial states after landfilling.
2. Soft ground mined for meeting construction requirements can be filled with solid wastes and made reusable for agriculture purposes.
3. A small part of solid wastes is composed. After sorting out metals, glass and similar inorganic materials, the rest of refuse is converted to a peat like organic fertilizer and soil conditioner.

### 6. Eutrication: -

See Multan Board Answer No: 12

### 7. Geothermal Energy: -

See Bahawalpur Board Answer No: 9

### 8. Two Causes of Water Pollution: -

#### 1. Oil: -

Oil pollution of sea has become a familiar event, to kill life in water, particularly, life dependent on aquatic producers and consumers of other levels.

#### 2. Various detergents: -

Various detergents also enter the water from houses and laundries to pollute with various harmful effects.

### 9. Wild Life: -

1. It refers to all non-cultivated plants and non-domesticated animals.
2. Wild animals and plants are among most valuable non-renewable resources.
3. Game animals and plants have been major source of food for humans.
4. It plays very important role in food chain. Without

these the food chain can be disturbed to such an extent

that it will be very difficult to maintain the balance.

5. They play an important role in the balance of nature.

6. Man has been disturbing this balance since very long.

Man has destroyed natural habitats of wild life, as a result of which many animals and plants have either become extinct or else in their number as to be on the verge of extinction. These are known as Endangered Species.

**10. Eutrophication: -**

See Multan Board Answer No: 12

**11. Fossil Fuels: -**

Faisalabad Board Answer No: 7

**10. Differences between Afforestation and Reforestation: -**

See Multan Board Answer No: 11

**11. Effects of Acid rain: -**

1. Acid rain destroys the necessary nutrients present in the waters of rivers and lakes etc. It lowers the pH of water. Most of the aquatic animals cannot survive at this pH.

2. Acid rain washes nutrients out of soil, damages the bark and leaves of trees and harms root hairs. Leaf pigments (chlorophyll) are also destroyed.

3. Metallic surfaces exposed to acid rain are easily corroded. Fabrics, papers and leather products loose their material strength or disintegrates easily.

4. Building materials such as limestone, marble, dolomite, mortar, and slate are weakened with acid rains because of formation of soluble compounds.

Thus, acid rain is dangerous for historical

monuments.

The building of famous Taj Mahal has been corroded

at many places, due to acid rain.

**12. Importance of Ozone Layer: -**

See Gujranwala Board Answer No: 12

**13. Biodiversity: -**

See Exercise Chapter No: 27 Answer No: 4

**14. Eutrophication: -**

See Multan Board Answer No: 12

**15. Water Pollution: -**

See Exercise Chapter No: 27 Answer No: 5

**16. Eutrophication: -**

See Multan Board Answer No: 12

**17. A) Solid Waste: -**

See Lahore Board Answer No: 20

**B) How Energy be Obtained From Solid Waste: -**

See Sargodha Board Answer No: 6

**18. Hydroelectric Power: -**

1. In hydroelectric power the energy of falling water is used to generate electricity.

2. Hydroelectric power is produced in mountain regions

or hilly areas of a country where rivers make natural fall.

3. The flow of water throughout the year to continue power

generation throughout the year may be regulated by storing the river water in reservoirs (lakes).

4. In Pakistan a major part of power requirements are

supplied by Tarbela Mangla and to some extent by Warsak and Dargai hydroelectric schemes.

**19. A) Stone Cancer: -**

Corrodation of building materials such as limestone, marble, dolomite, mortar and stale is known as stone cancer.

**B) Cause of Stone Cancer: -**

Sulphuric acid in acid rain is the cause of stone cancer.

**20. Difference between Afforestation and Reforestation: -**

| Afforestation                                                                  | Reforestation                                                                                                      |
|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| 1. It is the establishment of new forests where no forests existed previously. | 1. It is the establishment of forests where previously forests existed but had been destroyed due to some reasons. |
| 2. It occurs slowly.                                                           | 2. It occurs rapidly.                                                                                              |

**21. Eutrophication: -**

See Multan Board Answer No: 12

**22. Effects of Mismanaged Agriculture Ecosystem: -**

See Rawalpindi Board Answer No: 8

**SAHIWAL BOARD QUESTIONS**

1. Differentiate between Deforestation and Afforestation.

(Sahiwal Board-2013-

A)

2. Give the effect of ozone layer depletion.

(Sahiwal Board-2013-

A)

3. What is Demography?

(Sahiwal Board-Old Scheme-2014-

A)

4. Differentiate between deforestation and afforestation.

(Sahiwal Board-Old Scheme-2014-

A)

5. What are pollutants?

(Sahiwal Board-New Scheme-2014-

A)

6. What are renewable resources? Give examples.

(Sahiwal Board-New Scheme-2014-

A)

7. What are Reenwabl and Non-renewable resources?

(Sahiwal Board-New Scheme-2015-

A)

**Answers**

**1. Differences between Deforestation and Afforestation: -**

See Exercise Chapter No:27 Answer No: 27

**2. The Effect of Ozone Layer Depletion: -**

More ultraviolet rays reach the earth's surface due to ozone layer depletion. They will affect all life on earth

by increasing temperature. They cause skin cancer and

cataracts in humans. They can also effect crops, plants,

trees and even plankton and distort weather patterns.

**3. Demography: -**

It is the study of human populations and things that affect them.

**4. Differences between Deforestation and**

**Afforestation: -**

See Exercise Chapter No: 27 Answer No: 27

**5. Pollutants: -**

1. The harmful substances are called pollutants.
2. The pollutants in the air are:

- a. Chlorofluorocarbons (CFCs)
  - b. Carbon dioxide
  - c. Sulfur dioxide
  - d. Lead compounds
  - e. Oxides of nitrogen
  - f. Carbon monoxide
3. Water pollutants are:
  - a. Sewage water
  - b. Oil
  - c. Detergents such as phosphates and nitrates
  - d. Industrial effluents
4. Soil pollutants are:
  - a. Fertilizers
  - b. Pesticides
  - c. Trash
  - d. Organic manure
  - e. Plastic materials
  - f. Cans
  - g. Agriculture and industrial wastes

**6. Renewable Resources with Examples:-**

See Lahore Board Answer No: 18

**7. Renewable and Non-Renewable Resources: -**

See Gujranwala Board Answer No: 11

**SECTION (III)****LONG QUESTIONS**

Chapter No: 15 ----- 4 Marks

Chapter No: 16 ----- 4 Marks

Chapter No: 17 ----- 4 Marks

Chapter No: 18 ----- 4 Marks

Chapter No: 19 ----- 4 Marks

Chapter No: 20 ----- 4 Marks

Chapter No: 21 ----- Nil

Chapter No: 22 ----- 4 Marks

Chapter No: 23 ----- Nil

Chapter No: 24 ----- 4 Marks

Chapter No: 25 ----- 4 Marks

Chapter No: 26 ----- Nil

Chapter No: 27 ----- 4 Marks

**CHAPTER 15****HOMEOSTSIS****LAHORE BOARD LONG QUESTIONS**

1. Describe various kidney problems and their cure. (8) (Lahore Board (2008-

A)

2. Discuss the nature of excretory products in animals to

various habitats, specifically in association of water availability. (8) (Lahore Board (2009-

A)

3. Discuss kidney problems in humans.

(4)

(Lahore Board (2010-

A)

4. Describe osmoregulation in terrestrial Environment. (4)

(Lahore Board (2011-

A)

5. Write down the structure of nephron. (4)

(Lahore Board Group I (2012-

A)

6. Describe about excretion in plants. (4)

(Lahore Board Group II (2012-

A)

7. What is excretion? How do plants excrete their wastes?

(4) (Lahore Board Group I (A)

2013)

8. Describe the excretion in plants.

(4)

(Lahore Board Group II (A)

2013)

9. How kidney stones are formed and cured?

(4)

(Lahore Board (Session-2010-2013-Group-II-2014-

A)

10. Write a note on osmoregulation in marine animals.

(4)

(Lahore Board (Session-2012-2014-Group-I-2014-

A)

11. Explain excretion in plants.

(4)

(Lahore Board (Session-2012-2014-Group-II-2014-

A)

**GUJRANWALA BOARD LONG QUESTIONS**

1. Write a detailed note on excretion in plants.

(4)

(Gujranwala Board (2008-

A)

2. Describe the structure and function of the urinary system in man with special reference to nephron.

(8)

(Gujranwala Board (2009-

A)

3. Discuss the nature excretory products in different habitats. (4) (Gujranwala Board (2010-

A)

4. Explain thermoregulation in mammals.

(4)

(Gujranwala Board (2011-

A)

5. Explain osmoregulation in marine animals.

(4)

(Gujranwala Board (2012-

A)

6. Explain the adaptations in plants to low and high temperature. (4) (Gujranwala Board (2013-

A)

7. Write a note on thermoregulation in plants.

(4)

(Gujranwala Board-New Scheme-2014-

- A)  
8. Describe osmoregulation in plants.  
(4)

(Gujranwala Board-New Scheme-2015-

A)

### **MULTAN BOARD LONG QUESTIONS**

1. How Osmoregulation occurs in different environments? Explain. (8) (Multan Board (2008-

A)

2. Describe the process of excretion in Plants.  
(4)

(Multan Board (2008-

S)

3. Discuss some Kidney problems with their cure.  
(8)

(Multan Board (2009-

A)

4. Describe excretion in Earthworm and compare it with Planaria. (4)

(Multan Board (2010-

A)

5. Discuss major Homeostatic functions of the Liver.  
(4)

(Multan Board (2011-

A)

6. Describe briefly the structure of human Nephron.  
(4)

(Multan Board (2011-

S)

7. Account the Excretory System in Earthworm.  
(4)

(Multan Board (2012-

A)

8. Draw the labeled diagram Nephron of kidney.  
Explain

its function. (4)

(Multan Board (2012-

S)

9. Highlight the role of liver as an excretory structure.  
(4)

(Multan Board (2013-

A)

10. Discuss some kidney problems with their cure.  
(4)

(Multan Board (Old Scheme) (2014-

A)

11. Describe the adaptations in plants to low and high temperature.  
(4)

(Multan Board (New Scheme) (2014-

A)

12. Explain Urinary System of Human.  
(4)

(Multan Board-New Scheme-2015-

A)

### **BAHAWALPUR BOARD LONG QUESTIONS**

1. Define excretion. Explain excretion in plants and animals. (8) (Bahawalpur Board (2008-

A)

2. Discuss excretion in plants.  
(4)

(Bahawalpur Board (2009-

S)

3. Explain Urinary System of Man.  
(4)

(Bahawalpur Board (2010-

S)

4. Enlist various adaptations by which terrestrial animals maintain osmoregulation.  
(4)

(Bahawalpur Board (2011-

A)

5. Discuss Excretion in Plants.  
(4)

(Bahawalpur Board (2012-

A)

6. What is Renal Failure? Describe its cure.  
(4)

(Bahawalpur Board (2013-

A)

7. Explain working of Nephron in Human Kidney.  
(4)

(Bahawalpur Board (New Scheme) (2014-

A)

8. Describe Thermoregulatory Strategies in Mammals including human in cold temperature.  
(4)

(Bahawalpur Board-New Scheme-2015-

A)

### **FAISALABAD BOARD LONG QUESTIONS**

1. Give the major homeostatic functions of the liver in man. (4) (Faisalabad Board (2008-

A)

2. Explain thermoregulation in mammals.  
(4)

(Faisalabad Board (2010-

A)

3. Discuss structure and function of nephrons.  
(4)

(Faisalabad Board (2011-

A)

4. Write down the structure of nephron.  
(4)

(Faisalabad Board (2012-

A)

5. Explain the structure of nephron by drawing a labeled diagram. (4)

(Faisalabad Board (2013-

A)

6. Write note on thermoregulation in mammals.  
(4)

(Faisalabad Board (New Scheme) (2014-

A)

7. Describe kidney as osmoregulatory organ.  
(4)

(Faisalabad Board-New Scheme-2015-

A)

### **RAWALPINDI BOARD LONG QUESTIONS**

1. Describe the function of a nephron in human body.  
(4)

(Rawalpindi Board (2011-

A)

2. Describe excretion in plants in detail.  
(4)

(Rawalpindi Board (2012-

A)



3. Describe osmoregulation in marine animals.  
(4)  
(Rawalpindi Board (2013-

- A)  
4. What is Renal failure? Describe its cure.  
(4)  
(Rawalpindi Board-New Pattern-2014-

- A)  
5. Define osmoregulation and describe osmoregulation in plants. (4) (Rawalpindi Board-New Pattern-2015-

### **SARGODHA BOARD LONG QUESTIONS**

1. With the help of diagram, explain the Urinary system in man. (4) (Sargodha Board (2010-

- A)  
2. Describe the process of excretion in plants (give brief account). (4) (Sargodha Board (2011-

- A)  
3. Explain the structure of Nephron.  
(4)  
(Sargodha Board (2012-

- A)  
4. Describe the urinary system of human.  
(4)  
(Sargodha Board (2013-

- A)  
5. Discuss kidney problems and their cures.  
(4)  
(Sargodha Board-New Scheme-2014-

### **DERA GHAZI KHAN BOARD LONG QUESTIONS**

1. Discuss excretion in cockroach.  
(4)  
(D.G.K. Board (2010-

- A)  
2. Define osmoregulation. How do animals osmoregulate in different environment. (4) (D.G.K. Board (2011-

- A)  
3. Give various adaptations of plants to low and high temperature. (4) (D.G.K. Board Group-I (2012-

- A)  
4. Describe thermoregulatory strategies in animals including humans.  
(4)  
(D.G.K. Board Group-II (2010-

- A)  
5. Describe briefly the structure and function of human Nephron. (4) (D.G.K. Board Group-I (2013-

- A)  
6. Draw a labeled diagram and explain the thermostat function of hypothalamus in human thermoregulation.  
(4) (D.G.K. Board Group-II (2013-

- A)  
7. Describe Osmoregulation in marine and freshwater animals. (4) (D.G.K. Board (New Course) Group-I)

- (2014-

- A)  
8. Explain briefly "Excretion in Plants".  
(4)  
(D.G.K. Board-New Course-Group-II-2014-

- A)  
9. Explain thermoregulation in mammals.  
(4)  
(D.G.K. Board-New Course-Group-I-2015-

- A)  
10. Discuss the liver as an excretory organs.  
(D.G.K. Board-New Scheme-Group-II-2015-

### **SAHIWAL BOARD LONG QUESTIONS**

1. Describe excretion and explain it in plants.  
(4)  
(Sahiwal Board (2013-

- A)  
2. Explain briefly "Excretion in Planaria".  
(4)  
(Sahiwal Board (New Scheme) (2014-

- A)  
3. Discuss the nature of excretory products in different habitats. (4) (Sahiwal Board-New Scheme-2015-

### **CHAPTER 16**

## **SPPORTS AND MOVEMENTS**

### **LAHORE BOARD LONG QUESTIONS**

1. Explain the role of  $Ca^{++}$  ions in the process of sliding filament model. (4) (Lahore Board (2010-

- A)  
2. What are joints? Describe their types.  
(4)  
(Lahore Board Group-I (2012-

- A)  
3. How is energy provided for muscle contraction?  
(4)  
(Lahore Board Group-II (2012-

- A)  
4. Explain about the exoskeleton in arthropods.  
(4)  
(Lahore Board Group-I (2013-

- A)  
5. Define and explain briefly the fibrous, cartilaginous and synovial joints.  
(4)  
(Lahore Board Group-II (2013-

- A)  
6. Give an account of paratonic movements in plants.  
(4)  
(Lahore Board-Session-2012-2014-Group-I-2014-

- A)  
6. Describe the tropic movements in plants.  
(4)  
(Lahore Board-Session-2012-2014-Group-I-2014-

- A)

### **GUJRANWALA BOARD LONG QUESTIONS**

1. What is the structure of a bone? How does repair of

- broken bone take place?  
(4)  
(Gujranwala Board (2008-  
A)  
2. Describe the contraction of sarcomere, as initiated by nerve impulse. (4) (Gujranwala Board (2010-  
A)  
3. Describe paratonic movements in plants.  
(4)  
(Gujranwala Board (2011-  
A)  
4. Give an account of structure of skeletal muscle.  
(4)  
(Gujranwala Board (2012-  
A)  
5. Describe locomotion in *Paramecium*.  
(4)  
(Gujranwala Board (2013-  
A)  
6. Give the structure of skeletal muscle.  
(4)  
(Gujranwala Board-New Scheme-2014-  
A)  
7. Give sliding filament model for muscle contraction.(4)  
(Gujranwala Board-New Scheme-2015-  
A)  
**MULTAN BOARD LONG QUESTIONS**  
1. How locomotion occurs in *Paramecium*?  
(4)  
(Multan Board (2008-  
S)  
2. Describe Turgor Movements in Plants.  
(4)  
(Multan Board (2010-  
A)  
3. Describe locomotion in *Euglena* and *Paramecium*.  
(4)  
(Multan Board (2010-  
S)  
4. Explain Sliding Filament model of Muscle Contraction. (4) (Multan Board (2011-  
A)  
5. Explain some major functions of skeletal muscles.  
(4)  
(Multan Board (2011-  
S)  
6. Explain ultrastructure of myofilaments of skeletal muscle fibers. (4) (Multan Board (2012-  
A)  
7. Describe significance of secondary growth in plants.(4)  
(Multan Board (2012-  
S)  
8. Describe Locomotion in *Paramecium*.  
(4)  
(Multan Board (2013-  
A)  
9. Explain Ultrastructure of Myofilament.  
(4)  
(Multan Board (Old Scheme) (2014-  
A)  
10. Explain bones of human skull with diagram.  
(4)

- (Multan Board (New Scheme) (2014-  
A)  
11. Describe Ultrastructure of Myofilament of skeletal muscle. (4) (Multan Board-New Scheme-2015-  
A)  
**BAHAWALPUR BOARD LONG QUESTIONS**  
1. Write a detailed note on repair of broken bone.  
(4)  
(Bahawalpur Board (2008-  
A)  
2. Give the arrangement of Vertebrae in Vertebral Column. (4) (Bahawalpur Board (2009-  
A)  
3. Explain four phases of repair process of Broken Bones.  
(4)  
(Bahawalpur Board (2010-  
A)  
4. Describe Locomotion in Earthworm.  
(4)  
(Bahawalpur Board (2011-  
A)  
5. Describe Locomotion in *Paramecium*.  
(4)  
(Bahawalpur Board (2012-  
A)  
6. Define and describe the Hydrostatic Skeleton.  
(4)  
(Bahawalpur Board (2013-  
A)  
7. Write a note on Joints.  
(4)  
(Bahawalpur Board (New Scheme) (2014-  
A)  
8. Describe the structure of Skeletal Muscle.  
(4)  
(Bahawalpur Board-New Scheme-2015-  
A)  
**FAISALABAD BOARD LONG QUESTIONS**  
1. Describe the repair of broken bones.  
(4)  
(Faisalabad Board (2008-  
A)  
2. What are paratonic movements? Describe its various types. (4) (Faisalabad Board (2010-  
A)  
3. Describe the ultrastructure of skeletal muscles.  
(4)  
(Faisalabad Board (2011-  
A)  
4. Explain sliding filament model of muscle contraction.  
(4)  
(Faisalabad Board (2012-  
A)  
5. Discuss method of locomotion in *Paramecium*.  
(4)  
(Faisalabad Board (2013-  
A)  
6. Give structure of skeletal muscle.  
(4)  
(Faisalabad Board-New Scheme-2014-  
A)  
7. Explain tropic movements in plants.  
(4)

(Faisalabad Board-New Scheme-2015-

A)

**RAWALPINDI BOARD LONG QUESTIONS**

1. Describe the repair process of a simple fracture of bone. (4) (Rawalpindi Board (2010-

A)

2. Discuss sliding filament model of Muscle contraction. (4)

(Rawalpindi Board (2011-

A)

3. Explain about significance of secondary growth in plants. (4) (Rawalpindi Board (2012-

A)

4. Describe briefly Exoskeleton in Arthropods along with

Molting. (4)

(Rawalpindi Board (2013-

A)

5. Define joints. How are they classified.

(4)

(Rawalpindi Board-New Pattern-2014-

A)

6. Differentiate between Sclerenchyma cells and Collenchyma cells and sketch their diagrams.

(4)

(Rawalpindi Board-New Pattern-2015-

A)

**SARGODHA BOARD LONG QUESTIONS**

1. Describe the deformities of Skeleton.

(4)

(Sargodha Board (2010-

A)

2. Describe the four phases by which repair of simple fracture of a bone takes place.

(4)

(Sargodha Board (2011-

A)

3. Describe sliding filament model of muscle contraction.

(4)

(Sargodha Board (2012-

A)

4. Describe about the Disc Slip.

(4)

(Sargodha Board (2013-

A)

5. Explain sliding filament model.

(4)

(Sargodha Board-New Scheme-2014-

A)

**DERA GHAZI KHAN BOARD LONG QUESTIONS**

1. Describe four Phases in the repair process of simple fracture of a bone. (4) (D.G.K. Board (2009-

A)

2. What are joints Give their different types.

(4)

(D.G.K. Board (2010-

A)

3. Write a note on Hydro-skeleton.

(4)

(D.G.K. Board (2011-

A)

4. Describe Hydro-skeleton with examples.

(4)

(D.G.K. Board Group-I (2012-

A)

5. How birds adapted for flight?

(4)

(D.G.K. Board Group-II (2012-

A)

6. Define and explain the significance of secondary growth in plants.

(4)

(D.G.K. Board Group-I (2013-

A)

7. Explain the process of repair of broken bones.

(4)

(D.G.K. Board Group-II (2013-

A)

8. Describe different types of joints.

(4)

(D.G.K. Board-New Course-Group-I-2014-

A)

9. Describe locomotion in air.

(4)

(D.G.K. Board-New Course-Group-II-2014-

A)

10. Give an account of skull bones.

(4)

(D.G.K. Board-New Course-Group-I-2015-

A)

11. What is bone fracture? Describe repair process of simple fracture.

(4)

(D.G.K. Board-New Course-Group-II-2015-

A)

**SAHIWAL BOARD LONG QUESTIONS**

1. Describe Sliding Filament Model of Muscle Contraction. (4) (Sahiwal Board (2013-

A)

2. List some major functions of the skeletal system.

(4)

(Sahiwal Board (New Scheme) (2014-

A)

3. What are joints? Explain their types.

(4)

(Sahiwal Board-New Scheme-2015-

A)

**CHAPTER 17****COORDINATION AND CONTROL****LAHORE BOARD LONG QUESTIONS**

1. Discuss the important factors which involve in changing the resting membrane potential to active membrane potential. (4) (Lahore Board (2009-

A)

2. Describe the roles and commercial application of gibberellins. (4) (Lahore Board (2010-

A)

3. Write a brief note on Conditioned Reflex Type I.

(4)

(Lahore Board (2011-

A)

4. Describe the role of auxins.  
(4)  
(Lahore Board Group-I (2012-A))
5. Describe the comparison of the nervous system of hydra and planaria.  
(4)  
(Lahore Board Group-II (2012-A))
6. Describe role of Absciscic Acid and ethane in plant growth. (4)  
(Lahore Board Group-I (2013-A))
7. Discuss the nervous system of Hydra.  
(4)  
(Lahore Board Group-II (2013-A))
9. Define and explain "Nerve Impulse".  
(4)  
(Lahore Board-Session-2010-2013-Group II-2014-A)
10. Define and explain the nerve impulse.  
(4)  
(Lahore Board-Session-2012-2014-Group I-2014-A)
11. Describe the initiation of nerve impulse .  
(4)  
(Lahore Board-Session-2012-2014-Group-II-2014-A)

### **GUJRANWALA BOARD LONG QUESTIONS**

1. Discuss the functions and commercial applications of Auxins. (8)  
(Gujranwala Board (2009-A))
2. Discuss pituitary as an endocrine gland.  
(4)  
(Gujranwala Board (2010-A))
3. Describe major factors which involve in changing the resting membrane potential to active membrane potential. (4)  
(Gujranwala Board (2011-A))
4. Give a labeled account of synapse.  
(4)  
(Gujranwala Board (2012-A))
5. How does nerve impulse pass from one neuron to another neuron? Explain.  
(4)  
(Gujranwala Board (2013-A))
6. How nerve impulse is passed from one neuron to another neuron? Explain.  
(4)  
(Gujranwala Board-New Scheme-2014-A)
7. Describe the functions of the thyroid gland.  
(4)  
(Gujranwala Board-New Scheme-2015-A)

### **MULTAN BOARD LONG QUESTIONS**

1. Define Nerve Impulse. Explain the mechanism involved by labeled diagram. (Multan Board (2008-A))
  2. Describe the conduction of nerve impulse.  
(4)  
(Multan Board (2008-S))
  3. Compare Nervous Coordination with Chemical Coordination. (8)  
(Multan Board (2009-S))
  4. Explain Pituitary as an Endocrine Gland.  
(8)  
(Multan Board (2009-S))
  5. Explain the role of the hormones produced by the anterior lobe of [pituitary gland].  
(4)  
(Multan Board (2010-A))
  6. Explain the role of the hormones produced by pancreas. (4)  
(Multan Board (2010-S))
  7. Discuss two common disorders of nervous system in humans. (4)  
(Multan Board (2010-S))
  8. Discuss the role of Hormones secreted by Ovary.  
(4)  
(Multan Board (2011-A))
  9. Explain Posterior lobe of pituitary gland as an endocrine gland. (4)  
(Multan Board (2011-S))
  10. Give Sensory Receptors and their functions in detail.  
(4)  
(Multan Board (2012-A))
  11. Describe transmission of nerve impulse through synapse. (4)  
(Multan Board (2012-S))
  12. Compare Nervous System of Hydra and Planaria.  
(4)  
(Multan Board (2013-A))
  13. Explain the process of Feedback Mechanism with an example. (4)  
(Multan Board (Old Scheme) (2014-A))
  14. Describe briefly the functions of different parts of human brain. (4)  
(Multan Board (New Scheme) (2014-A))
  15. Write down detailed note on Adrenals.  
(4)  
(Multan Board-New Scheme-2015-A)
- ### **BAHAWALPUR BOARD LONG QUESTIONS**
1. Describe different types of learning behavior.  
(8)  
(Bahawalpur Board (2008-S))
  2. Describe four different types of learning behavior.  
(8)  
(Bahawalpur Board (2009-A))

3. Compare the Nervous System of Hydra with Planaria.  
(4) (Bahawalpur Board (2010-

A)  
4. Elaborate Latent Learning and Insight Learning.  
(4) (Bahawalpur Board (2011-

A)  
5. Write note on Thyroid Gland.  
(4) (Bahawalpur Board (2012-

A)  
6. Define Plant Hormones. Describe the role of Auxins.  
(4) (Bahawalpur Board (2013-

A)  
7. Compare Nervous System in Planaria and Hydra.  
(4) (Bahawalpur Board (New Scheme) (2014-

A)  
8. Explain Secretions and their role of anterior lobe of Pituitary Gland.  
(4) (Bahawalpur Board-New Scheme-2015-

#### **FAISALABAD BOARD LONG QUESTIONS**

1. Define Nerve Impulse. Explain mechanism of conduction of nerve impulse in a neuron.  
(4) (Faisalabad Board (2008-

A)  
2. How do Nervous system of *Planaria* better developed than that of *Hydra*. (4) (Faisalabad Board (2009-

A)  
3. Briefly describe plant hormones.  
(4) (Faisalabad Board (2010-

A)  
4. What is synapse? How do neurotransmitters help in passage of nerve impulse from one neuron to another?  
(4) (Faisalabad Board (2011-

A)  
5. Nervous system of *Planaria* is better developed than *Hydra*. Discuss. (4) (Faisalabad Board (2012-

A)  
6. What are receptors? Describe various types of receptors found in humans.  
(4) (Faisalabad Board (2013-

A)  
7. Describe various hormones secreted by anterior lobe of pituitary gland.  
(4) (Faisalabad Board (New Scheme) (2014-

A)  
8. Describe the major factors involved in resting membrane potential.  
(4) (Faisalabad Board-New Scheme-2015-

A)  
**RAWALPINDI BOARD LONG QUESTIONS**

1. Explain the mechanism of nerve impulse.  
(4) (Rawalpindi Board (2010-

A)  
2. Explain the role of hormones produced by the posterior lobe of pituitary gland.  
(4) (Rawalpindi Board (2011-

A)  
3. Explain the mechanism of transmission of nerve impulse through a synapse.  
(4) (Rawalpindi Board (2012-

A)  
4. Describe the instinctive behavior with examples.  
(4) (Rawalpindi Board (2013-

A)  
5. Explain the role of auxins in plants.  
(4) (Rawalpindi Board-New Pattern-2014-

A)  
6. Describe role of commercial applications of Auxins. (4)  
(Rawalpindi Board-New Pattern-2015-

A)  
**SARGODHA BOARD LONG QUESTIONS**

1. What is synapse? How communication takes place across a synapse? (4) (Sargodha Board (2010-

A)  
2. Explain the hormones which are released by Posterior lobe of Pituitary gland? (4)  
(Sargodha Board (2011-

A)  
3. Compare the nervous system of *Hydra* with *Planaria*.  
(4) (Sargodha Board (2012-

A)  
4. Give detail of various factors involved in changing resting membrane potential into active membrane potential. (4) (Sargodha Board (2013-

A)  
5. Discuss role of hormones secreted by anterior lobe of pituitary gland.  
(4) (Sargodha Board-New Scheme-2014-

A)  
**DERA GHAZI KHAN BOARD LONG QUESTIONS**

1. Explain the process of feedback mechanism with an example. (4) (D.G.K. Board (2009-

A)  
2. Define receptor and explain its types.  
(4) (D.G.K. Board (2010-

A)  
3. Discuss the role and commercial application of Auxins.

- (4) (D.G.K. Board (2011-  
A)  
4. Write note on posterior lobe of pituitary gland.  
(4) (D.G.K. Board Group-I (2012-  
A)  
5. Write a note on synapse.  
(4) (D.G.K. Board Group-II (2012-  
A)  
6. Define neuron. Describe the structure of a neuron in detail. (4) (D.G.K. Board Group-I (2013-  
A)  
7. What are biological clocks? How are they caused?  
(4) (D.G.K. Board Group-II (2013-  
A)  
8. What are receptors? Classify and explain each class.  
(4) (D.G.K. Board-New Scheme-Group-I-2014-  
A)  
9. What is Reflex Arc? Describe the flow of information through the Nervous System.  
(4) (D.G.K. Board-New Scheme-Group-II-2014-  
A)  
10. Describe feedback mechanism with example.  
(4) (D.G.K. Board-New Scheme-Group-I-2015-  
A)  
11. Discuss hormones of anterior lobe of pituitary gland.  
(4) (D.G.K. Board-New Scheme-Group-II-2015-  
A)

### **SAHIWAL BOARD LONG QUESTIONS**

1. Explain the role of hormones produced by pancreas. (4) (Sahiwal Board (2013-  
A)  
2. Write a note Thyroid Gland.  
(4) (Sahiwal Board (New Scheme) (2014-  
A)  
3. Write a note on nervous disorders.  
(4) (Sahiwal Board-New Scheme-2015-  
A)

## **CHAPTER 18**

### **REPRODUCTION**

#### **LAHORE BOARD LONG QUESTIONS**

1. What are the main functions of placenta during pregnancy? (4) (Lahore Board (2009-  
A)  
2. Discuss the process of birth in human female.  
(4) (Lahore Board (2010-  
A)  
3. Describe the steps in Menstrual Cycle in human female. (4) (Lahore Board (2011-  
A)  
4. Give a comprehensive comparison between sexual and

asexual reproduction.

- (4) (Lahore Board Group-I (2012-  
A)  
5. Discuss male reproductive system in man.  
(4) (Lahore Board Group-II (2012-  
A)  
6. Write a short note tissue culturing and cloning.  
(4) (Lahore Board Group-I (2013-  
A)  
7. Explain the process of birth in Humans.  
(4) (Lahore Board Group-II (2013-  
A)  
8. Give an account of sexually transmitted diseases in man.  
(4) (Lahore Board-Session- 2012-2014-Group II-2014-  
A)  
9. Explain the role of phytochromes in photoperiodism. (4) (Lahore Board-Session- 2012-2014-Group II-2014-  
A)

### **GUJRANWALA BOARD LONG QUESTIONS**

1. Differentiate between asexual and sexual reproduction and also describe human female reproductive cycle.  
(8) (Gujranwala Board (2008-  
A)  
2. Explain the process of cloning. Give its uses and advantages. (4) (Gujranwala Board (2010-  
A)  
3. Describe the male reproductive system of man.  
(4) (Gujranwala Board (2011-  
A)  
4. Discuss the effect of quality of light on photoperiodism  
(4) (Gujranwala Board (2012-  
A)  
5. Describe human male reproductive system.  
(4) (Gujranwala Board (2013-  
A)  
6. Discuss the process of birth in human female.  
(4) (Gujranwala Board-New Scheme-2014-  
A)  
7. Discuss the role of phytochromes in understanding the mechanism of photoperiodism.  
(4) (Gujranwala Board-New Scheme-2015-  
A)  
**MULTAN BOARD LONG QUESTIONS**  
1. Discuss Female Reproductive cycle in Human.  
(8)

- (Multan Board (2009-  
A)  
2. Discuss different types of Asexual Reproduction in Animals. (4) (Multan Board (2010-  
A)  
3. Write a note on Sexually Transmitted diseases in Human. (4) (Multan Board (2011-  
A)  
4. Write down male reproductive system in humans. (4) (Multan Board (2011-  
S)  
5. What is the role of Phytochromes in flowering? (4) (Multan Board (2012-  
A)  
6. Describe various methods of asexual reproduction in animals. (4) (Multan Board (2012-  
S)  
7. Describe Human Female Menstrual Cycle. (4) (Multan Board (2013-  
A)  
8. Discuss Vernalisation. (4) (Multan Board (Old Scheme) (2014-  
A)  
9. Give detail of sexually transmitted disease. (4) (Multan Board (New Scheme) (2014-  
A)  
10. Explain the process of Cloning. Give its uses and advantages. (4) (Multan Board-New Scheme-2015-  
A)

**BAHAWALPUR BOARD LONG QUESTIONS**

1. Describe human female reproductive cycle in detail. (8) (Bahawalpur Board (2008-  
A)  
2. Explain the role of Phytochromes in Photoperiodism. (4) (Bahawalpur Board (2009-  
A)  
3. Describe any four Sexually Transmitted Diseases. (4) (Bahawalpur Board (2010-  
A)  
4. Describe Human Female Reproductive System. (4) (Bahawalpur Board (2010-  
S)  
5. Draw the Graphic life cycle of Angiosperm. No description is required. (4) (Bahawalpur Board (2010-  
S)  
6. What is Menstrual Cycle? Give its primary steps. (4) (Bahawalpur Board (2011-  
A)  
7. What is Pathenogenesis? Describe its types. (4) (Bahawalpur Board (2012-  
A)

8. Explain the stages of Menstrual Cycle. (4) (Bahawalpur Board (2013-  
A)  
9. Write a note on "Fruit Set and Fruit Ripening". (4) (Bahawalpur Board-New Scheme-2014-  
A)  
10. Explain the process of Birth in Human. (4) (Bahawalpur Board-New Scheme-2015-  
A)

**FAISALABAD BOARD LONG QUESTIONS**

1. Describe human female reproductive cycle. (8) (Faisalabad Board (2009-  
A)  
2. List the types of reproduction in plants. Also sketch bryophyte life cycle. (8) (Faisalabad Board (2010-  
A)  
3. Describe male reproductive system in human being. (4) (Faisalabad Board (2011-  
A)  
4. Elaborate child birth in humans. (4) (Faisalabad Board (2012-  
A)  
5. Explain the role of phytochromes in photoperiodism. (4) (Faisalabad Board (2013-  
A)  
6. Discuss the process of birth in human female. (4) (Faisalabad Board (New Scheme) (2014-  
A)  
7. Define Photoperiodism. Explain role of phytochromes in in photoperiodism. (4) (Faisalabad Board-New Scheme-2015-  
A)

**RAWALPINDI BOARD LONG QUESTIONS**

1. Give graphical / diagrammatically representation of Bryophyte life cycle. (4) (Rawalpindi Board (2010-  
A)  
2. Illustrate human female reproductive cycle. (4) (Rawalpindi Board (2011-  
A)  
3. Describe human female reproductive cycle. (4) (Rawalpindi Board (2012-  
A)  
4. Describe female reproductive cycle. (4) (Rawalpindi Board (2013-  
A)  
5. Explain about "Seed Dormancy". (4) (Rawalpindi Board-New Pattern-2014-  
A)  
6. What are the functions of placenta during pregnancy?

- (4) (Rawalpindi Board-New Pattern-2015-A)

### **SARGODHA BOARD LONG QUESTIONS**

- Describe the process of Birth in human female.  
(4) (Sargodha Board (2010-A)
- Describe briefly various steps involved in human female reproductive cycle.  
(4) (Sargodha Board (2011-A)
- Compare asexual reproduction with sexual reproduction. (4) (Sargodha Board (2012-A)
- Discuss the process of birth in human female.  
(4) (Sargodha Board (2013-A)
- Define Parthenogenesis. Explain briefly different kinds of Parthenogenesis.  
(4) (Sargodha Board-New Scheme-2014-A)

### **DERA GHAZI KHAN BOARD LONG QUESTIONS**

- Describe various types of Asexual reproduction  
(8) (D.G.K. Board (2009-A)
- Describe male reproductive system in man.  
(4) (D.G.K. Board (2010-A)
- What is reproduction? Explain about cloning.  
(4) (D.G.K. Board (2011-A)
- Describe the steps in menstrual cycle in human female.  
(4) (D.G.K. Board Group-I (2012-A)
- What is the function of placenta during pregnancy.  
(4) (D.G.K. Board Group-II (2012-A)
- What is Asexual reproduction? Explain with reference to parthenogenesis and types and advantages.  
(4) (D.G.K. Board Group-I (2013-A)
- Describe human female reproductive cycle.  
(4) (D.G.K. Board Group-II (2013-A)
- Discuss human female reproductive system.  
(4) (D.G.K. Board-New Course-Group-I-2014-A)

- Define vernalization. Discuss its importance in plants.  
(4) (D.G.K. Board-New Course-Group-II-2014-A)
- What is parthenocarpy? How fruits ripened?  
(4) (D.G.K. Board-New Course-Group-I-2015-A)
- Write a note on tissue culturing.  
(4) (D.G.K. Board-New Course-Group-II-2015-A)

### **SAHIWAL BOARD LONG QUESTIONS**

- Define and explain vernalisation.  
(4) (Sahiwal Board (2013-A)
- Describe Female reproductive cycle.  
(4) (Sahiwal Board (New Scheme) (2014-A)
- Describe human menstrual cycle.  
(4) (Sahiwal Board-New Scheme-2015-A)

## **CHAPTER 19**

### **GROWTH AND DEVELOPMENT**

#### **LAHORE BOARD LONG QUESTIONS**

- Describe the role of nucleus in development.  
(4) (Lahore Board (2010-A)
- What is aging? Explain this process.  
(4) (Lahore Board Group-I (2013-A)
- Define abnormal development. Explain different factors causing abnormalities.  
(4) (Lahore Board Group-II (2013-A)
- Write a note on abnormal development.  
(4) (Lahore Board-Session- 2012-2014-Group-I-2014-A)
- Discuss different phases of plants growth.  
(4) (Lahore Board-Session- 2012-2014-Group-II-2014-A)

#### **GUJRANWALA BOARD LONG QUESTIONS**

- What is regeneration? Explain the process of regeneration in animals. (4) (Gujranwala Board (2013-A)
- Explain embryonic induction.  
(4) (Gujranwala Board-New Scheme-2014-A)



3. Describe the process of aging.

(4)

(Gujranwala Board-New Scheme-2015-

A)

### **MULTAN BOARD LONG QUESTIONS**

1. Explain the development of Chick with diagram.

(8)

(Multan Board (2008-

A)

2. Define Aging. Write its symptoms / signs and mechanism. How can it be slowed down.

(8)

(Multan Board (2008-

S)

3. Describe the role of Nucleus in Development.

(4)

(Multan Board (2010-

A)

4. What is Regeneration? Discuss it in various Animals.

(4)

(Multan Board (2010-

S)

5. Describe Growth Correlation in Plants.

(4)

(Multan Board (2013-

A)

6. Write a note on Abnormal Development.

(4)

(Multan Board (New Scheme) (2014-

A)

7. Write a note on GrowthCorrelations.

(4)

(Multan Board-New Scheme-2015-

A)

### **BAHAWALPUR BOARD LONG QUESTIONS**

1. What is regeneration? Explain it with the help of examples in different groups of animals.

(8)

(Bahawalpur Board (2008-

A)

2. Describe external factors that influence the growth rate in plants. (4)

(Bahawalpur Board (2009-

A)

3. Describe role of Nucleus in development.

(4)

(Bahawalpur Board (2009-

S)

4. Write a note on Embryonic Induction.

(4)

(Bahawalpur Board (2010-

S)

5. Define Primary and Secondary Growth. Explain external factors affecting the growth rate in plants.

(4)

(Bahawalpur Board (2013-

A)

6. Write a brief note on Abnormal Development.

(4)

(Bahawalpur Board (New Scheme) (2014-

A)

7. Describe the role of Nucleus in Development.

(4)

(Bahawalpur Board (New Scheme) (2015-

A)

### **FAISALABAD BOARD LONG QUESTIONS**

1. Write a note on Regeneration.

(4)

(Faisalabad Board (2009-

A)

2. Describe the development of chick up to blastula formation. (4)

(Faisalabad Board (2010-

A)

3. Describe the role of nucleus in development by giving example of Acetabularia (unicellular algae).

(4)

(Faisalabad Board (2013-

A)

4. Explain embryonic induction.

(4)

(Faisalabad Board (New Scheme) (2014-

A)

5. Write a note on aging.

(4)

(Faisalabad Board-New Scheme-2015-

A)

### **RAWALPINDI BOARD LONG QUESTIONS**

1. What is growth? Discuss different phases of Growth in plants. (4)

(Rawalpindi Board (2013-

A)

2. Describe the process of aging.

(4)

(Rawalpindi Board-New Pattern-2014-

A)

3. What is aging? How will you explain this process.

(4)

(Rawalpindi Board-New Pattern-2015-

A)

### **SARGODHA BOARD LONG QUESTIONS**

1. Write a detailed note on regeneration.

(4)

(Sargodha Board (2010-

A)

2. Discuss external factors that effect growth rate in plants. (4)

(Sargodha Board (2013-

A)

3. Explain how the growth rate is influenced by external factors. (4)

(Sargodha Board-New Scheme-2014-

A)

### **DERA GHAZI KHAN BOARD LONG QUESTIONS**

1. Explain growth correlations in plants.

(4)

(D.G.K. Board (2010-

A)

2. Discuss the role of nucleus in development.

(4)

(D.G.K. Board Group-I (2013-

A)

3. Define Aging; Explain this process.

(4)

(D.G.K. Board Group-II (2013-

A)

4. Explain role of Nucleus in development.

(4)

(D.G.K. Board-New Course-Group-I-2014-

A)

5. Describe the process of Regeneration in various groups of animals.

(4)

(D.G.K Board-New Course-Group-II-2014-

A)

6. Write a note on Growth correlations.

(4)

(D.G.K Board-New Course-Group-I-2015-

A)

7. Explain abnormal development.

(4)

(D.G.K Board-New Course-Group-I-2015-

A)

### **SAHIWAL BOARD LONG QUESTIONS**

1. Describe the phases of growth in plants.

(4)

(Sahiwal Board (2013-

A)

2. Define Regeneration. Explain it in various groups of animals. (4) (Sahiwal Board (New Scheme) (2014-

A)

3. Write a note on differentiation.

(4)

(Sahiwal Board-New Scheme-2015-

A)

## **CHAPTER 20**

### **CHROMOSOMES AND DNA**

#### **LAHORE BOARD LONG QUESTIONS**

1. What is transcription? How it occurs?

(4)

(Lahore Board (2008-

A)

2. Explain how DNA encodes protein structure.

(4)

(Lahore Board (2010-

A)

3. Write about Meselson and Stahl experiment.

(4)

(Lahore Board (2011-

A)

4. Describe one gene / one polypeptide hypothesis considering the work of Beadle and Tatum.

(4)

(Lahore Board Group-II (2012-

A)

5. Describe Meselson and Stahl experiment to show semiconservative replication.

(4)

(Lahore Board Group-II (2012-

A)

6. Describe Watson and Crick Model of DNA in detail. (4) (Lahore Board Group-I (2013-

A)

7. Describe how Hershey and Chase proved that DNA is

the hereditary material.

(4)

(Lahore Board Group-II (2013-

A)

8. Explain double helical structure of DNA.

(4)

(Lahore Board-Session-2012-2014-Group-I-2014-

A)

9. Write a note on genetic code.

(4)

(Lahore Board-Session-2012-2014-Group-II-2014-

A)

### **GUJRANWALA BOARD LONG QUESTIONS**

1. Write process of replication of DNA?

(4)

(Gujranwala Board (2008-

A)

2. Describe the work Beadle and Tatum on Neurospora.

(4)

(Gujranwala Board (2009-

A)

3. Explain DNA replication process.

(4)

(Gujranwala Board (2010-

A)

4. Describe the process of transcription.

(4)

(Gujranwala Board (2011-

A)

5. Write a note on mutation.

(4)

(Gujranwala Board (2012-

A)

6. Describe the chemical composition of chromosome.

(4)

(Gujranwala Board (2013-

A)

7. Describe chemical composition of chromosomes.

(4)

(Gujranwala Board-New Scheme-2014-

A)

8. Discuss the process of initiation of translation along charging of tRNA.

(4)

(Gujranwala Board-New Scheme-2015-

A)

### **MULTAN BOARD LONG QUESTIONS**

1. How did Meselson and Stahl show that DNA replication is Semiconservative.

(4)

(Multan Board (2009-

A)

2. Describe the process of Transcription.

(8)

(Multan Board (2009-

S)

3. Explain the process of transcription in detail.

(4)

(Multan Board (2010-

S)

4. How did Hershey and Chase demonstrate that DNA is

- the hereditary material? (4) (Multan Board (2011-A))
5. Explain one gene one polypeptide hypothesis. (4) (Multan Board (2011-S))
6. Write a note on Genetic Code. (4) (Multan Board (2012-A))
7. How DNA replicate? (4) (Multan Board (2012-S))
8. Give the chemical nature of DNA. (4) (Multan Board (2013-A))
9. Explain Replication Process of DNA. (4) (Multan Board (New Scheme) (2014-A))
10. Write a note on Genetic Code. (4) (Multan Board-New Scheme-2015-A)

#### **BAHAWALPUR BOARD LONG QUESTIONS**

1. Give an account of the Chromosome theory of inheritance. (8) (Bahawalpur Board (2008-S))
2. How it was proved that DNA is the hereditary material? (8) (Bahawalpur Board (2009-A))
3. Describe the physical and chemical structure of Chromosomes. (8) (Bahawalpur Board (2009-S))
4. Describe the Watson and Crick's model of DNA. (4) (Bahawalpur Board (2010-A))
5. Give brief note on Translation. (4) (Bahawalpur Board (2010-S))
6. Describe Transcription Process. (4) (Bahawalpur Board (2010-S))
7. Describe the process of Transformation. (4) (Bahawalpur Board (2011-A))
8. How would you prove that DNA replicates by Semi-conservative Method? (4) (Bahawalpur Board (2012-A))
9. Give an account of Genetic Code. (4) (Bahawalpur Board (2013-A))
10. Explain briefly "Watson and Crick's Model of DNA" (4) (Bahawalpur Board-New Scheme-2014-A)
11. Describe Double Helical structure of DNA (Watson

- and Crick's Model). (4) (Bahawalpur Board-New Scheme-2015-A)

#### **FAISALABAD BOARD LONG QUESTIONS**

1. Explain the double helical structure of DNA and its replication process. (8) (Faisalabad Board (2008-A))
2. Write about the process of replication of DNA. (4) (Faisalabad Board (2009-A))
3. What is karyotype? Write down types of chromosomes with respect to centromeric position diagrammatically. (4) (Faisalabad Board (2011-A))
4. How did Hershey and Chase demonstrate that DNA is hereditary material? (4) (Faisalabad Board (2012-A))
5. Describe the function of DNA polymerase III in the process of replication. (4) (Faisalabad Board (2013-A))
6. Describe chemical composition of chromosome. (4) (Faisalabad Board (New Scheme) (2014-A))
7. Explain process of translation. (4) (Faisalabad Board-New Scheme-2015-A)

#### **RAWALPINDI BOARD LONG QUESTIONS**

1. Elaborate the chromosomal theory of heredity. How did Morgan support it experimentally? (4) (Rawalpindi Board (2011-A))
2. Elaborate chromosomal theory of heredity. (4) (Rawalpindi Board (2012-A))
3. How did Hershey and Chase prove experimentally that DNA is hereditary material? (4) (Rawalpindi Board (2013-A))
4. How did Messelson and Stahl show that DNA replication is semiconservative? (4) (Rawalpindi Board-New Pattern-2014-A))
5. How did Meselson and Stahl show that DNA replication is semiconservative? (4) (Rawalpindi Board-New Scheme-2015-A))

#### **SARGODHA BOARD**

1. Explain the process of Transcription. (4)

- (Sargodha Board (2010-  
A)  
2. Elaborate the composition of chromosome in detail.  
(4) (Sargodha Board (2011-  
A)  
3. How did Meselson and Stahl prove that DNA  
replication is semi-conservative?  
(4) (Sargodha Board (2012-  
A)  
4. Explain the Watson's and Crick's model of DNA.  
(4) (Sargodha Board (2013-  
A)  
5. Explain chemical nature of DNA.  
(4) (Sargodha Board-New Scheme-2-14-  
A)

### **DERA GHAZI KHAN BOARD LONG QUESTIONS**

1. Describe the process of synthesis of RNA.  
(4) (D.G.K. Board (2010-  
A)  
2. Write briefly on Transcription.  
(4) (D.G.K. Board (2011-  
A)  
3. Describe Hershey and Chase experiment to prove that  
DNA is the hereditary material.  
(4) (D.G.K. Board Group-I (2012-  
A)  
4. What is concluded by Meselson and Stahl  
experiment?  
(4) (D.G.K. Board Group-II (2012-  
A)  
5. Describe experiment performed by Meselson and  
Stahl to evaluate Hypothesis of DNA replication.  
(4) (D.G.K. Board Group-I (2013-  
A)  
6. Explain the experiment of Hershey and Chase to  
prove DNA is as hereditary material.  
(4) (D.G.K. Board Group-II (2013-  
A)  
7. Explain the process of Transcription.  
(4) (D.G.K. Board-New Course-Group-I-2014-  
A)  
8. Discuss what is Genetic code.  
(4) (D.G.K. Board-New Course-Group-I-2015-  
A)  
9. Define mutation. Describe point mutations with the  
help of example.  
(4)

- (D.G.K. Board-New Course-Group-II-2015-  
A)

### **SAHIWAL BOARD LONG QUESTIONS**

1. Describe about Watson and Crick model of DNA.  
(4) (Sahiwal Board (2013-  
A)  
2. How the cells use RNA to make protein?  
(4) (Sahiwal Board (New Scheme) (2014-  
A)  
3. Sketch and label DNA replication fork.  
(4) (Sahiwal Board-New Scheme-2015-  
A)

### **CHAPTER 21**

### **CELL CYCLE**

*No Essay Type Question According to  
New Pattern*

### **CHAPTER 22**

### **VARIATION AND GENETICS**

### **LAHORE BOARD LONG QUESTIONS**

1. Write a note on multiple alleles.  
(4) (Lahore Board (2009-  
A)  
2. Describe the patterns of sex determination in  
animals.  
(4) (Lahore Board (2010-  
A)  
3. What is Mendel's law of segregation? Illustrate with  
an example. (4) (Lahore Board (2011-  
A)  
4. What is incomplete dominance? Explain it with an  
example. (4) (Lahore Board Group-I (2012-  
A)  
5. Discuss the genetics of ABO blood group system.  
(4) (Lahore Board Group-I (2012-  
A)  
6. What is Epistasis? Explain it with an example of  
(4) Bombay Phenotype. (Lahore Board Group-I (2013-  
A)  
7. What is incomplete dominance? Explain it with an  
example. (4) (Lahore Board Group-II (2013-  
A)  
8. Describe the genetics of color blindness. In humans  
(4) (Lahore Board-Session-2012-2014-Group-I-2014-  
A)  
9. Explain different patterns of sex determination in  
animals.  
(4) (Lahore Board-Session-2012-2014-Group-I-2014-  
A)

### **GUJRANWALA BOARD LONG QUESTIONS**

1. What are polygene? Explain polygenic inheritance with examples. (4) (Gujranwala Board (2008-A))
2. Describe Mendel's Law of Segregation with the help of an example. (4) (Gujranwala Board (2009-A))
3. Discuss Mendel's law of Independent Assortment. (4) (Gujranwala Board (2011-A))
4. Write a note on co-dominance with an example. (4) (Gujranwala Board (2012-A))
5. Compare chromosomal determination of sex in *Drosophila* and humans. (4) (Gujranwala Board (2013-A))
6. Write a short note on multiple alleles (4) (Gujranwala Board-New Scheme-2014-A)
7. Discuss the genetics of colorblindness. (4) (Gujranwala Board-New Scheme-2015-A)

**MULTAN BOARD LONG QUESTIONS**

1. Define Multiple alleles. Describe multiple allele blood group system of man. (8) (Multan Board (2008-A))
2. Define Mendel's law of Independent Assortment. Explain it with example. (8) (Multan Board (2008-S))
3. Define Mendel's law of segregation. Explain with example. (4) (Multan Board (2009-A))
4. Give an account of Rh blood group system and Erythroblastosis Foetalis. (8) (Multan Board (2009-S))
5. How sex is determined in Man and Grasshopper? (4) (Multan Board (2010-A))
6. Explain genetics of Hemophilia in humans. (4) (Multan Board (2010-S))
7. Describe Test Cross with the help of Cross. (4) (Multan Board (2011-A))
8. Write a note on Diabetes Mellitus type I. (4) (Multan Board (2011-S))
9. Explain Sex Determination in Plants. (4)

- (Multan Board (2012-A))
10. Compare chromosomal determination of sex between *Drosophila* and Humans. (4) (Multan Board (2012-S))
11. Discuss Genetics of Color Blindness. (4) (Multan Board (2013-A))
12. Write a note on Rh Blood group system. (4) (Multan Board (Old Scheme) (2014-A))
13. Give Genetics of Color Blindness. (4) (Multan Board (New Scheme) (2014-A))
14. Define Epistasis and explain it with Bombay Phenotype. (4) (Multan Board-New Scheme-2015-A)

**BAHAWALPUR BOARD LONG QUESTIONS**

1. Explain the Law of Independent Assortment with the help of an example. (4) (Bahawalpur Board (2008-A))
2. Give an account of the Chromosomal theory of inheritance. (4) (Bahawalpur Board (2008-S))
3. Starting from RRYy x rryy, represent 9:3:3:1 ratio with the help of Punnet Square (Checker Board). (4) (Bahawalpur Board (2009-S))
4. Explain the law of Independent Assortment with the help of Checker Board. (4) (Bahawalpur Board (2010-A))
5. With the help of Checker Board indicate the progeny of a cross between two plants with Genotype RrYy. (4) (Bahawalpur Board (2011-A))
6. Describe Inheritance of Hemophilia. (4) (Bahawalpur Board (2012-A))
7. Define and explain Gene Pool. (4) (Bahawalpur Board (2013-A))
8. Describe Incomplete Dominance. (4) (Bahawalpur Board (New Scheme) (2014-A))
9. Describe XO-XX and XY-XX type patterns of sex determination. (4) (Bahawalpur Board (New Scheme) (2015-A))

**FAISALABAD BOARD LONG QUESTIONS**

1. Explain Mendel's law of Independent Assortment. (4)

- (Faisalabad Board (2010-  
A)  
2. Give comparison of chromosomal determination of sex between *Drosophila* and Humans.  
(4)

- (Faisalabad Board (2011-  
A)  
3. Discuss genetics of color-blindness.  
(4)

- (Faisalabad Board (2012-  
A)  
4. Describe law of segregation with an example.  
(4)

- (Faisalabad Board (2013-  
A)  
5. Explain the pattern of sex determination in humans and grasshopper.  
(4)

- (Faisalabad Board (Old Scheme) (2014-  
A)  
6. Write a short note on multiple alleles.  
(4)

- (Faisalabad Board (New Scheme) (2014-  
A)  
7. Describe different patterns of sex determination.  
(4)

- (Faisalabad Board-New Scheme-2015-  
A)

#### **RAWALPINDI BOARD LONG QUESTIONS**

1. Explain diabetes mellitus type II and its genetic basis.  
(4) (Rawalpindi Board (2011-  
A)

2. What are reasons to use *Drosophila* as an experimental organisms. (4) (Rawalpindi Board (2012-  
A)

3. How sex is determined in various groups in plants?  
(4) (Rawalpindi Board (2013-  
A)

4. Explain codominance with the help of MN blood group system man.  
(4)

- (Rawalpindi Board-New Pattern-2014-  
A)

5. Explain pleiotropy with the help of examples.  
(4) (Rawalpindi Board-New Pattern-2015-  
A)

#### **SARGODHA BOARD QUESTIONS**

1. How does Maternal-foetal Rh-Incompatibility take place. Explain. (4) (Sargodha Board (2010-  
A)

2. Write a note on crossing over. ▲  
(4) (Sargodha Board (2011-  
A)

3. Discuss epistasis and pleiotropy.  
(4)

- (Sargodha Board (2012-  
A)  
4. Describe Crossing over briefly.  
(4)

- (Sargodha Board (2013-  
A)  
5. Define and explain test cross.  
(4)

- (Sargodha Board-New Scheme-2014-  
A)

#### **DERA GHAZI KHAN BOARD**

1. Discuss different patterns of sex determination.  
(4) (D.G.K. Board (2009-  
A)

2. Explain any two patterns of sex-determination with diagram. (4) (D.G.K. Board (2010-  
A)

3. How Sex is determined in Man and Grasshopper?  
(4) (D.G.K. Board (2011-  
A)

4. How Morgan experimentally proved the theory of Heredity? (4) (D.G.K. Board Group-I (2012-  
A)

5. How Morgan experimentally proved the theory of Heredity? (4) (D.G.K. Board Group-II (2012-  
A)

6. Write a note on Bombay phenotype and Pleiotropy.  
(4) (D.G.K. Board Group-I (2013-  
A)

7. What is Rh-factor? Describe its role in pregnancy and blood trans fusion.  
(4)

- (D.G.K. Board Group-II (2013-  
A)

8. Define and explain test cross.  
(4) (D.G.K. Board-New Course-Group-I-2014-  
A)

9. Describe the Mendel's Law of Independent Assortment with a an example.  
(4) (D.G.K. Board-New Course-Group-II-2014-  
A)

10. Describe Epistasis with an example.  
(4) (D.G.K. Board-New Course-Group-I-2015-  
A)

11. Define and explain Mendel's Law of Independent Assortment.  
(4) (D.G.K. Board-New Course-Group-II-2015-  
A)

- (Sahiwal Board (2013-  
A)

1. Discuss sex-determination in plants.  
(4)

- (Sahiwal Board (2013-  
A)

2. Define and explain test cross.  
(4)

3. Define and explain test cross.  
(4)

4. Define and explain test cross.  
(4)

5. Define and explain test cross.  
(4)

6. Define and explain test cross.  
(4)

7. Define and explain test cross.  
(4)

2. Discuss Genetics of color-blindness.  
(4)  
(Sahiwal Board (New Scheme) (2014-  
A)  
3. Write a note on Bombay Phenotype.  
(4)  
(Sahiwal Board-New Scheme-2015-  
A)

**CHAPTER 23****BIOTECHNOLOGY**

*No Essay Type Question According to  
New Pattern*

**CHAPTER 24****EVOLUTION****LAHORE BOARD LONG QUESTIONS**

1. Describe the evidences of evolution from  
Biogeography and fossil record.(8)  
(Lahore Board (2008-  
A)  
2. Explain the theory of inheritance of Acquired  
Characteristic. (4) (Lahore Board (2010-  
A)  
3. Discuss evolution from prokaryote to eukaryote.  
(4)  
(Lahore Board (2011-  
A)  
4. Write a note on evolution from prokaryotes to  
eukaryotes. (4) (Lahore Board Group-I (2012-  
A)  
5. State different factors affecting gene frequency.  
(4)  
(Lahore Board Group-II (2012-  
A)  
6. Describe the evidences of evolution from  
comperative anatomy.  
(4)  
(Lahore Board-Session-2012-2014-Group-I-2014-  
A)  
6. Discuss evolution from prokaryotes to eukaryotes.  
(4)  
(Lahore Board-Session-2012-2014-Group-II-2014-  
A)

**GUJRANWALA BOARD LONG QUESTIONS**

1. Describe the different ideas of the evolution of  
eukaryotes from prokaryotes.  
(4)  
(Gujranwala Board (2010-  
A)  
2. Elaborate the evolution of eukaryotes from  
prokaryotes. (4) (Gujranwala Board (2011-  
A)  
3. Describe Hardy-Weinberg Theorun.  
(4)  
(Gujranwala Board (2012-  
A)  
4. Explain Darwin theory of natural selection.  
(4)

- (Gujranwala Board-New Scheme-2014-  
A)  
5. Explain Darwin Theory of Natural Selection.  
(4)  
(Gujranwala Board-New Scheme-2015-  
A)

**MULTAN BOARD LONG QUESTIONS**

1. State and explain Hardy Weinberg theorem.  
(4)  
(Multan Board (2008-  
S)  
2. Give two evidences in favor of evolution.  
(4)  
(Multan Board (2010-  
A)  
3. Describe the process of Evolution of Eukaryotes  
from Prokaryotes. (4) (Multan Board (2010-  
S)  
4. What are Endangered Species? What measures could  
be adapted for their preservation?  
(4)  
(Multan Board (2011-  
A)  
5. How fossil record provides evidence in favor of  
evolution? (4) (Multan Board (2011-  
S)  
6. How are Prokaryotes evolved into Eukaryotes.  
(4)  
(Multan Board (2012-  
A)  
7. How evidences of embryology support the process of  
evolution? (4) (Multan Board (2012-  
S)  
8. How the Fossil Record and Comparative  
Embryology favor evolution. (4)  
(Multan Board (Old Scheme) (2014-  
A)  
9. Give detail of Hardy-Weinberg Theorum.  
(4)  
(Multan Board (New Scheme) (2014-  
A)  
10. Explain the evidence of evolution from  
Embryology.  
(4) (Multan Board-New Scheme-2015-  
A)

**BAHAWALPUR BOARD LONG QUESTIONS**

1. Give the main points of Darwin's theory natural  
selection. (4) (Bahawalpur Board (2008-  
S)  
2. Enumerate different factors that alter the gene  
frequency in a population. (4)  
(Bahawalpur Board (2009-  
S)  
3. Explain any two evidences of Evolution.  
(4)  
(Bahawalpur Board (2010-  
S)  
4. How does Comparative Anatomy provide evidence  
of evolution? (4) (Bahawalpur Board (2011-  
A)

5. Explain Lamarck's theory of Evolution.

(4)

(Bahawalpur Board (2012-

A)

6. What are Endangered Species? What measure could be adapted for their preservation?

(4)

(Bahawalpur Board-New Scheme-2014-

A)

7. Describe various factors affecting Gene Frequency.

(4)

(Bahawalpur Board-New Scheme-2015-

A)

### **FAISALABAD BOARD LONG QUESTIONS**

1. Describe Darwin's contributions Leading to theory of natural selection. (4)

(Faisalabad Board (2008-

A)

2. Write the main points of theory of natural selection.

(4)

(Faisalabad Board (2010-

A)

3. Describe the Hardy Weinberg theorem.

(4)

(Faisalabad Board (2011-

A)

4. Describe various factors affecting gene frequency.

(4)

(Faisalabad Board (2012-

A)

5. What two points are given by Darwin in his book "The Origin of Species".

(4)

(Faisalabad Board (Old Scheme) (2014-

A)

6. Explain Darwin theory of natural selection.

(4)

(Faisalabad Board (New Scheme) (2014-

A)

7. State and explain Hardy-Weinberg theorem.

(4)

(Faisalabad Board-New Scheme-2015-

A)

### **RAWALPINDI BOARD LONG QUESTIONS**

1. How did evolution proceed from Prokaryotes to Eukaryotes. (4)

(Rawalpindi Board (2010-

A)

2. Describe any two evidence in favor of evolution.

(4)

(Rawalpindi Board (2011-

A)

3. Discuss fossil record in favor of evolution.

(4)

(Rawalpindi Board (2012-

A)

4. Write a short note on Neo-Darwinism.

(4)

(Rawalpindi Board-New Pattern-2014-

A)

5. Describe factors affecting gene frequency.

(4)

(Rawalpindi Board-New Pattern-2015-

A)

### **SARGODHA BOARD LONG QUESTIONS**

1. Explain the main points of Darwin's theory of natural selection. (4)

(Sargodha Board (2010-

A)

2. Briefly describe any four factors that bring about change in gene frequency of a population.

(4)

(Sargodha Board (2011-

A)

3. Explain two evidences in favor of evolution.

(4)

(Sargodha Board (2012-

A)

4. Write a note on endangered species.

(4)

(Sargodha Board-New Scheme-2014-

A)

### **DERA GHAZI KHAN BOARD LONG QUESTIONS**

1. How comparative anatomy provides evidences for evolution? (4)

(D.G.K. Board (2009-

A)

2. Write about any two evidences in favor of evolution. (4)

(D.G.K. Board (2011-

A)

3. Explain Darwin's theory of natural selection.

(4)

(D.G.K. Board Group-I (2012-

A)

4. Write a note on endangered species.

(4)

(D.G.K. Board Group-II (2012-

A)

5. Describe comparative embryology and molecular biology as an evidence of evolution.

(4)

(D.G.K. Board-New Course-Group-I-2014-

A)

6. Discuss factors affecting gene frequency.

(4)

(D.G.K. Board-New Course-Group-II-2014-

A)

7. Explain membrane invagination theory for the evolution of eukaryotic cells.

(4)

(D.G.K. Board-New Course-Group-I-2015-

A)

8. Describe various factors affecting gene frequency.

(4)

(D.G.K. Board-New Course-Group-II-2015-

A)

### **SAHIWAL BOARD LONG QUESTIONS**

1. Explain Hardy-Weinberg theorem.

(4)

(Sahiwal Board (New Scheme) (2014-

A)

2. Describe any four factors affecting gene frequency.

(4)



(Sahiwal Board-New Scheme-2015-

A)

**CHAPTER 25****ECOSYSTEM****LAHORE BOARD LONG QUESTIONS**

1. Define succession. Describe succession on land.

(4)

(Lahore Board (2008-

A)

2. Describe nitrogen cycle. (4) (Lahore Board (2011-

A)

3. Explain the biotic components of an ecosystem.

(4)

(Lahore Board Group-II (2012-

A)

4. Explain briefly nitrogen cycle (No need of diagram).

(4)

(Lahore Board Group-II (2012-

A)

5. Explain "Deforestation and Aforestation".

(4)

(Lahore Board Group-I (2013-

A)

6. Write a short note on "Grazing".

(4)

(Lahore Board-Session-2012-2014-Group-I-2014-

A)

7. Describe different stages of succession in xerosere.

(4)

(Lahore Board-Session-2012-2014-Group-II-2014-

A)

**GUJRANWALA BOARD LONG QUESTIONS**

1. Define xerosere. Describe its different stages.

(4)

(Gujranwala Board (2009-

A)

2. Describe nitrogen cycle with the help of a figure.

(4)

(Gujranwala Board (2011-

A)

3. Explain "Nitrogen Cycle" (No need of diagram).

(4)

(Gujranwala Board (2012-

A)

4. Describe predation and parasitism and their

(4)

significance. (Gujranwala Board-New Scheme-2014-

A)

5. Explain the biotic components of an ecosystem.

(4)

(Gujranwala Board-New Scheme-2015-

A)

**MULTAN BOARD LONG QUESTIONS**

1. Compare the environmental conditions of aquatic and terrestrial ecosystem. (4)

(Multan Board (2009-

A)

2. Write a note on symbiosis. (4) (Multan Board (2009-

S)

3. Define Succession. Explain the different stages of Xerosere. (4)

(Multan Board (2010-

A)

4. Write note on Succession. (4) (Multan Board (2010-

S)

5. Define Succession. Write about its major stages.

(4)

(Multan Board (2011-

A)

6. Define Succession. Explain the different stages of Xerosere. (4)

(Multan Board (2011-

S)

7. Describe Symbiosis by giving two examples.

(4)

(Multan Board (2012-

A)

8. Explain three steps of Nitrogen cycle.

(4)

(Multan Board (2012-

S)

9. Write a detailed note on Grazing.

(4)

(Multan Board (Old Scheme) (2014-

A)

10. Discuss important steps of Nitrogen Cycle.

(4)

(Multan Board (New Scheme) (2014-

A)

11. Give an account of Nitrogen Cycle.

(4)

(Multan Board-New Scheme-2015-

A)

**BAHAWALPUR BOARD LONG QUESTIONS**

1. Describe the flow energy in ecosystem.

(4)

(Bahawalpur Board (2012-

A)

2. Describe Nitrogen Cycle as it occurs in Nature.

(4)

(Bahawalpur Board -New Scheme-2014-

A)

3. Explain Xerosere Succession Stages.

(4)

(Bahawalpur Board -New Scheme-2015-

A)

**FAISALABAD BOARD LONG QUESTIONS**

1. Draw and show different steps in nitrogen cycle. (No description required) (4) (Faisalabad Board (2011-

A)

2. Describe nitrogen cycle. (No need of diagram)

(4)

(Faisalabad Board (2012-

A)

3. What is biogeochemical cycle? Explain nitrogen cycle.

(4)

(Faisalabad Board (Old Scheme) (2014-

A)

4. Describe predation and parasitism and their significance.

(4)

(Faisalabad Board-New Scheme-2014-

A)

5. Describe predation and parasitism and their

(4)

significance. (Faisalabad Board-New Scheme-2015-

A)

**RAWALPINDI BOARD LONG QUESTIONS**

- Write a note on food web.  
(4)  
(Rawalpindi Board (2011-  
A)  
2. Discuss flow of energy in an ecosystem.  
(4)  
(Rawalpindi Board (2012-  
A)  
3. Write a note on grazing.  
(4)  
(Rawalpindi Board-New Pattern-2014-  
A)  
4. Define succession. Explain different stages of  
xerosere.  
(4)  
(Rawalpindi Board -New Scheme-2015-  
A)

**SARGODHA BOARD LONG QUESTIONS**

- Describe nitrogen cycle briefly. (No graphic sketch  
is needed) (4)  
(Sargodha Board (2011-  
A)  
2. Write note on grazing. (4)  
(Sargodha Board (2012-  
A)  
3. Give an account of Grazing.  
(4)  
(Sargodha Board-New Scheme-2014-  
A)

**DERA GHAZI KHAN BOARD LONG QUESTIONS**

- Briefly explain the Nitrogen cycle.  
(4)  
(D.G.K. Board (2010-  
A)  
2. Explain flow of Energy in an ecosystem.  
(4)  
(D.G.K. Board Group-I (2012-  
A)  
3. Define the following terms:  
(4)  
(i) Habitat (ii) Niche  
(iii) Food web (iv) Succession  
(D.G.K. Board-New Course-Group-I-2014-  
A)  
4. Explain briefly interaction between Biotic and A-  
biotic components in an ecosystem.  
(4)  
(D.G.K. Board-New Course-Group-II-2014-  
A)  
5. Describe biotic components of an ecosystem.  
(4)  
(D.G.K. Board-New Course-Group-I-2015-  
A)  
6. Explain stages of xerosere.  
(4)  
(D.G.K. Board-New Course-Group-II-2015-  
A)

**SAHIWAL BOARD LONG QUESTIONS**

- Describe the Nitrogen Cycle.  
(4)

(Sahiwal Board (New Scheme) (2014-

- A)  
2. Define biogeochemical cycles. Explain nitrogen  
cycle.  
with the help of diagram.  
(4)

(Sahiwal Board-New Scheme-2015-

A)

**CHAPTER 26****SOME MAJOR ECOSYSTEMS****No Essay Type Question According to New Patter****CHAPTER 27****MAN AND HIS ENVIRONMENT****LAHORE BOARD LONG QUESTIONS**

- Write a note on greenhouse effect.  
(4)  
(Lahore Board (2011-  
A)  
2. Write a note on ozone layer depletion.  
(4)  
(Lahore Board Group-I (2012-  
A)  
3. Give uses and misuses of agrochemicals.  
(4)  
(Lahore Board Group-I (2012-  
A)  
4. Discuss greenhouse effect in detail.  
(4)  
(Lahore Board Group-II (2013-  
A)  
5. Write a note on wild life.  
(4)  
(Lahore-Board-Session-2012-2014-Group-I-2014-  
A)  
5. Write a note on wild life and fossil fuels.  
(4)  
(Lahore-Board-Session-2012-2014-Group-II-2014-  
A)

**GUJRANWALA BOARD LONG QUESTIONS**

- Write a note on greenhouse effect.  
(4)  
(Gujranwala Board (2009-  
A)  
2. Discuss fossil fuels as exhaustible source of energy.  
(4)  
(Gujranwala Board (2010-  
A)  
3. Briefly explain wild life and fossil fuels.  
(4)  
(Gujranwala Board (2011-  
A)  
4. Describe "Ozone Layer Depletion".  
(4)  
(Gujranwala Board (2012-  
A)

5. Explain Greenhouse Effect.  
(4)  
(Gujranwala Board (2013-

A)  
6. Explain terms deforestation and afforestation.  
(4)  
(Gujranwala Board-New Scheme-2014-

A)  
7. Describe water and land as renewable resources.  
(4)  
(Gujranwala Board-New Scheme-2015-

#### **MULTAN BOARD LONG QUESTIONS**

1. Write a note on wild life as a resource.  
(4)  
(Multan Board (2010-

S)  
2. Enlist various measures for Energy Conservation.  
(4)  
(Multan Board (2011-

A)  
3. What are Acid Rains? Describe their effects.  
(4)  
(Multan Board (2011-

S)  
4. Write a note on Algal Bloom.  
(4)  
(Multan Board (2012-

A)  
5. Write a note on air pollution.  
(4)  
(Multan Board (2012-

S)  
6. Write note on: i) Wild life  
ii) Algal Bloom  
(4)  
(Multan Board (2013-

A)  
7. Describe the Phenomenon of Greenhouse Effect.  
(4)  
(Multan Board (Old Scheme) (2014-

A)  
8. Describe the importance of Forests.  
(4)  
(Multan Board (New Scheme) (2014-

A)  
9. Write a note on Greenhouse Effect.  
(4)  
(Multan Board-New Scheme-2015-

#### **BAHAWALPUR BOARD LONG QUESTIONS**

1. Discuss Eutrophication.  
(4)  
(Bahawalpur Board (2008-

A)  
2. Discuss about Green House Effect.  
(4)  
(Bahawalpur Board (2011-

A)  
3. What are causes and effects of Acid Rain?  
(4)  
(Bahawalpur Board (2012-

A)

4. What are Renewable and Non-Renewable Resources?  
Explain Air, Water, and Land with reference to their use to man. (4)  
(Bahawalpur Board (2013-

A)  
5. Write note on Green House Effect.  
(4)  
(Bahawalpur Board-New Scheme-2014-

A)  
6. What is Acid Rain? Explain its effects on environment.  
(4)  
(Bahawalpur Board-New Scheme-2015-

#### **FAISALABAD BOARD LONG QUESTIONS**

1. Describe Deforestation and Aforestation and also give importance of forests. (8)  
(Faisalabad Board (2009-

A)  
2. Write an essay on greenhouse effect.  
(4)  
(Faisalabad Board (2010-

A)  
3. What is acid rain? State its causes and influence.  
(4)  
(Faisalabad Board (2011-

A)  
4. Explain population explosion with its causes and on sequences.(4)  
Faisalabad Board (2012-

A)  
5. Write note on wild life.(4)  
(Faisalabad Board (2013-

A)  
6. Write a note on wild life.  
(4)  
(Faisalabad Board (Old Scheme) (2014-

A)  
7. Explain terms deforestation and afforestation.  
(4)  
(Faisalabad Board (New Scheme) (2014-

A)  
8. Describe deforestation and afforestation.  
(4)  
(Faisalabad Board-New Scheme-2015-

#### **RAWALPINDI BOARD LONG QUESTIONS**

1. Write a note on Acid rain and Green house effect.  
(8)  
(Rawalpindi Board (2010-

A)  
2. State and explain atmospheric pollution.  
(8)  
(Rawalpindi Board (2011-

A)  
3. Write a note on greenhouse effect.  
(4)  
(Rawalpindi Board (2012-

A)  
4. State the causes and effects of Green House effects.(4)  
(Rawalpindi Board (2013-

A)  
5. Write a note on wild life.  
(4)

(Rawalpindi Board-New Pattern-2014-

- A)  
6. Describe the water and land as renewable resources. (4)

(Rawalpindi Board-New Pattern-2015-

A)  
**SARGODHA BOARD LONG QUESTIONS**

1. Write a note on Ozone depletion.

(4)  
(Sargodha Board (2011-

- A)  
2. Explain greenhouse effect.

(4)  
(Sargodha Board (2012-

- A)  
3. What are non-renewable sources? Explain with examples. (4)

(Sargodha Board (2013-

- A)  
4. Briefly describe sources of energy.

(4)  
(Sargodha Board-New Scheme-2014-

A)

**DERA GHAZI KHAN BOARD LONG QUESTIONS**

1. What are Non-Renewable Resources? Explain with examples. (4)

(D.G.K. Board (2011-

- A)  
2. Explain the phenomenon of green house effect.

(4)  
(D.G.K. Board Group-I (2012-

- A)  
3. Write note on wild life.

(4)  
(D.G.K. Board Group-II (2012-

- A)  
4. What are non-renewable resources? Explain the types, uses and conservation of fossil fuels. Also discuss wind power as a source of energy.

(8)  
(D.G.K. Board Group-I (2013-

- A)  
5. Describe uses and misuses of agrochemicals.

(4)  
(D.G.K. Board Group-II (2013-

- A)  
6. Explain Green House effect and Acid Rain.

(4)  
(D.G.K. Board-New Course-Group-I-2014-

- A)  
7. Write a note on modification of Environments.

(4)  
(D.G.K. Board-New Course-Group-II-2014-

- A)  
8. Define and explain green house effect.

(4)  
(D.G.K. Board-New Course-Group-I-2015-

- A)  
9. Write down detailed note on Green house effect.

(4)

(D.G.K. Board-New Course-Group-II-2015-

A)  
**SAHIWAL BOARD LONG QUESTIONS**

1. Write a note on "Green House Effect".

(4)  
(Sahiwal Board (2013-

- A)  
2. Write a short note on "Importance of Forests".

(4)  
(Sahiwal Board (New Scheme) (2014-

- A)  
3. Describe the causes and effects of acid rain.

(4)  
(Sahiwal Board-New Scheme-2015-

A)

**SECTION IV**  
**PARACTICAL QUESTIONS**

Each question carries 5 Marks

Q. to be asked 5      Q. to be attempted 3

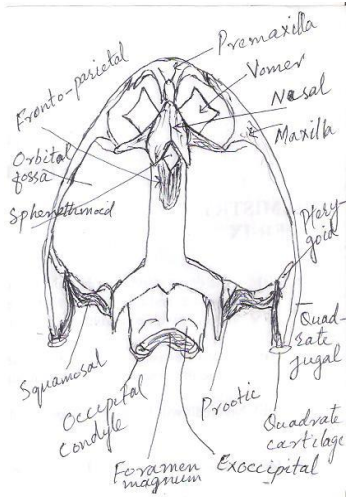
Total Marks:  $5 \times 3 = 15$

Section IV of Questions relating to Paracticals consists of five questions i.e. A, B, C, D and E.

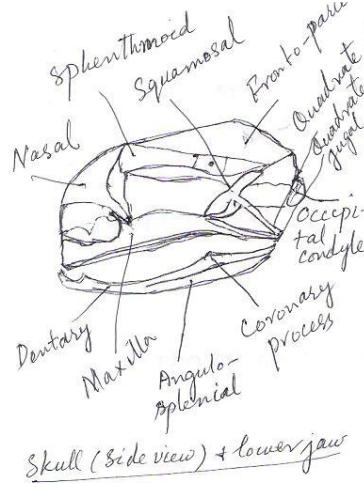
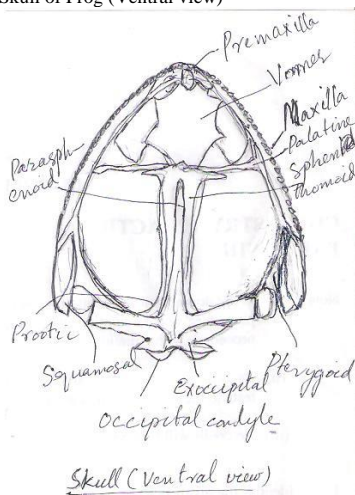
Only any three questions are to be attempted.

- I. In question A, it is asked to draw the labeled diagram of any one of the following skeletal part of frog.**

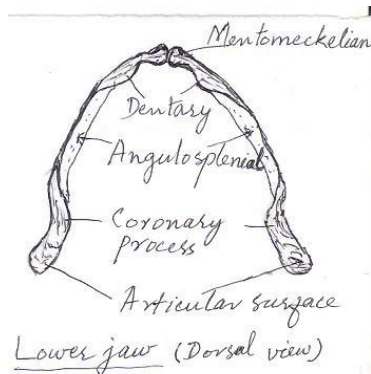
1. Skull of Frog (Dorsal view)



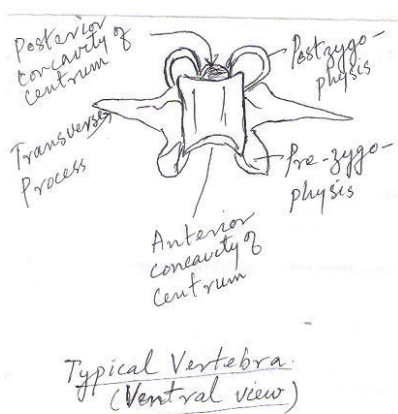
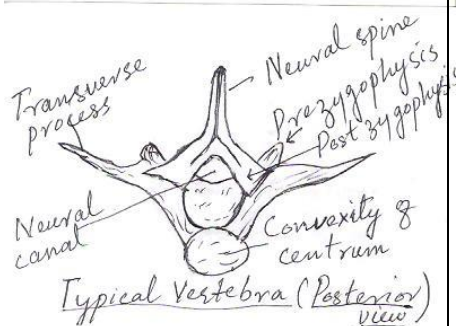
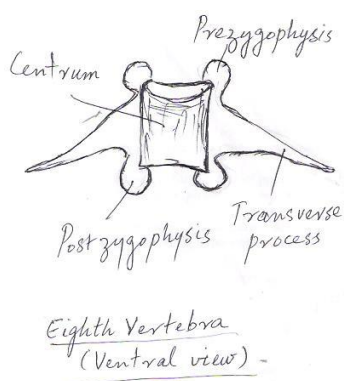
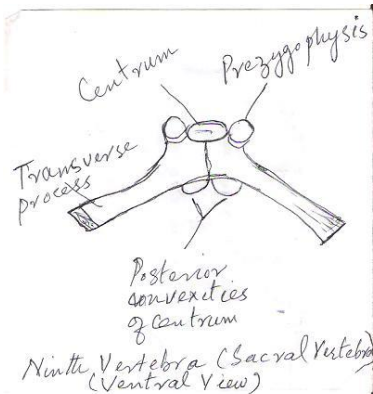
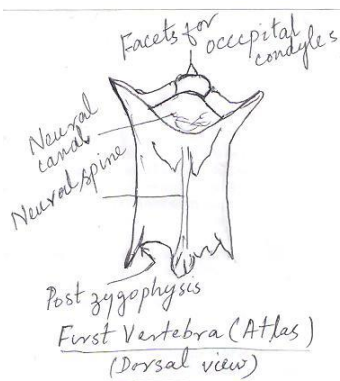
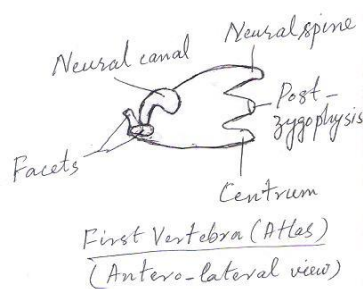
2. Skull of Frog (Ventral view)

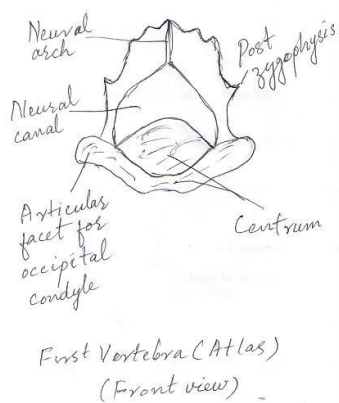


3. Lower Jaw of Frog

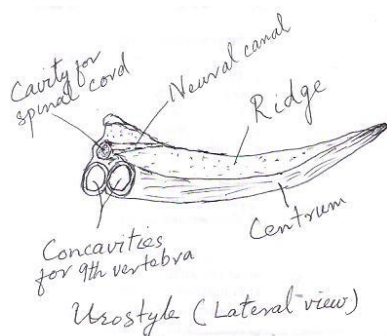


4. Typical Vertebra of Frog

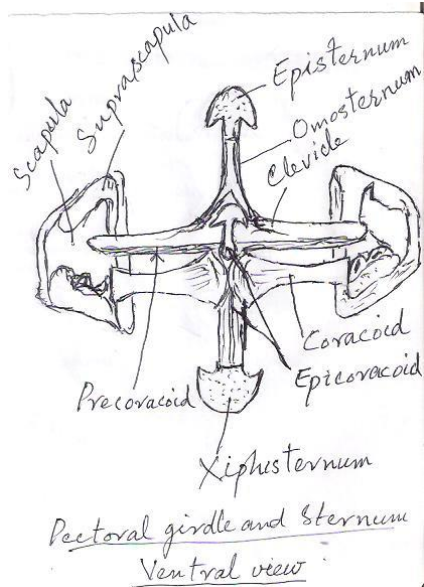
5. 8<sup>th</sup> Vertebra of Frog6. 9<sup>th</sup> Vertebra of Frog7. 1<sup>st</sup> Vertebra (Atlas) of Frog



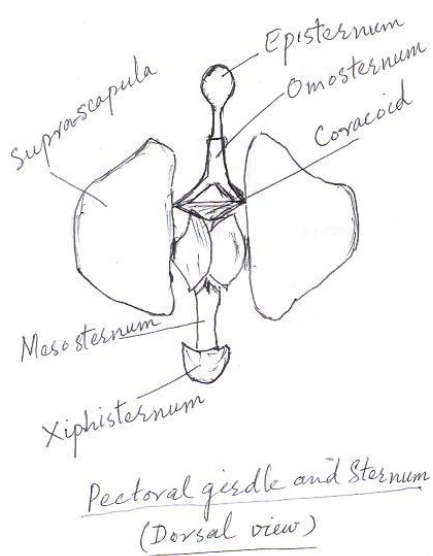
8. Urostyle (Lateral view)



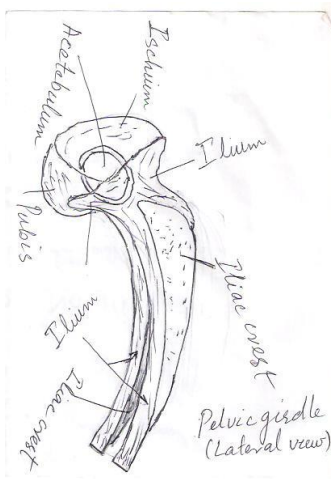
9. Pectoral girdle of Frog (Ventral view)



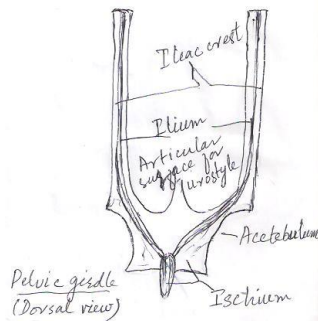
10. Pectoral girdle of Frog (Dorsal view)



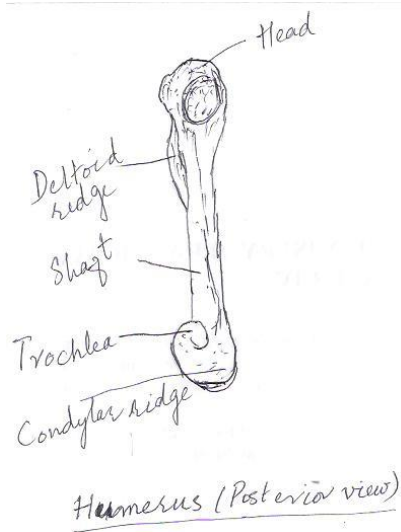
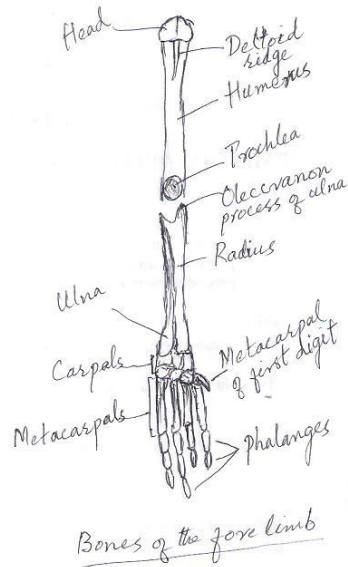
11. Pelvic girdle of Frog (Lateral view)



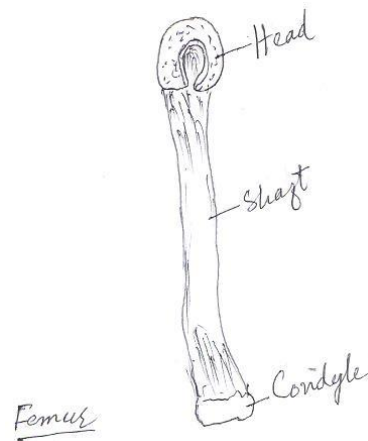
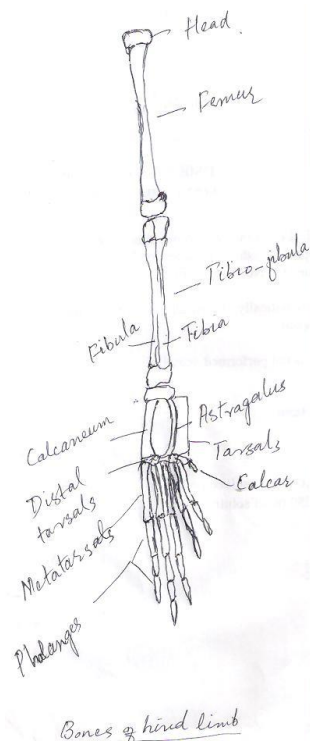
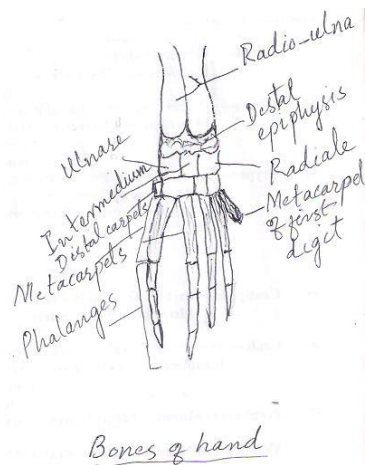
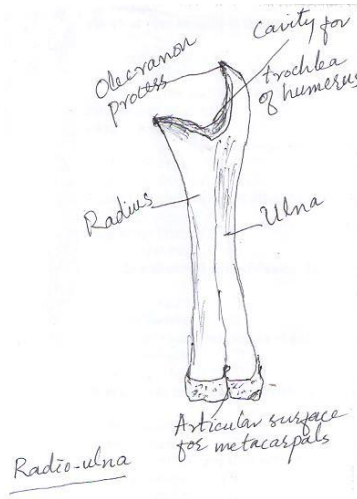
12. Pelvic girdle of Frog (Dorsal View)

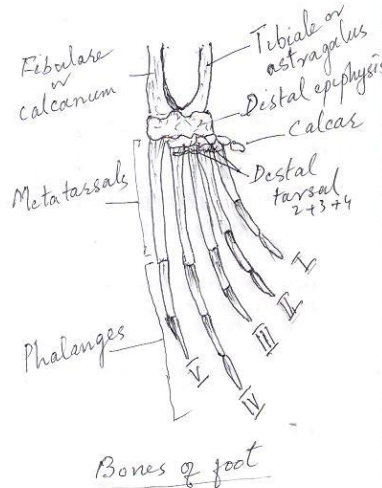
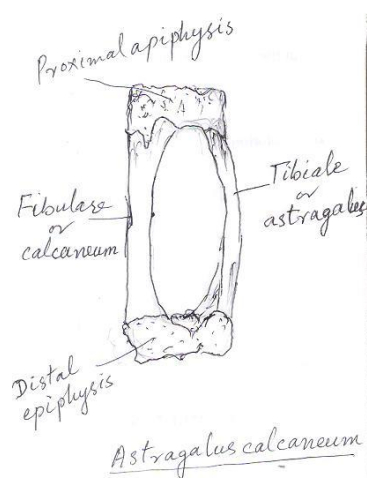
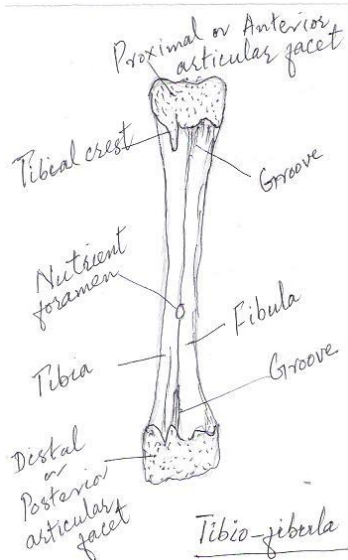


12. Fore limb of Frog









II. In question B, it is asked to draw the labeled diagram of one of the following systems of Frog and Cockroach.

A. Frog

a. Urinogenital organs of the Male

Frog

b. Urinogenital organs of the Female

B. Cockroach

Nervous System of Cockroach

A. Frog

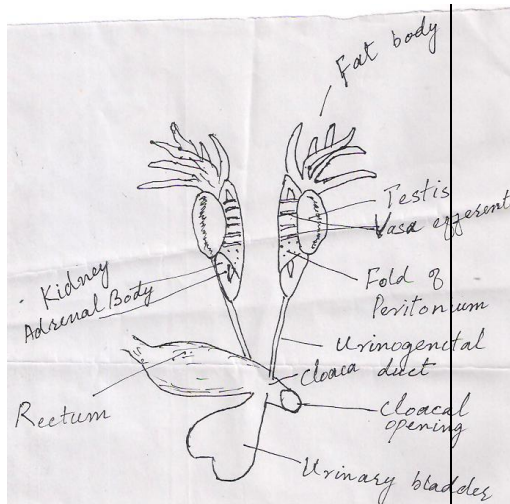
a. Urinogenital organs of Male Frog

Or

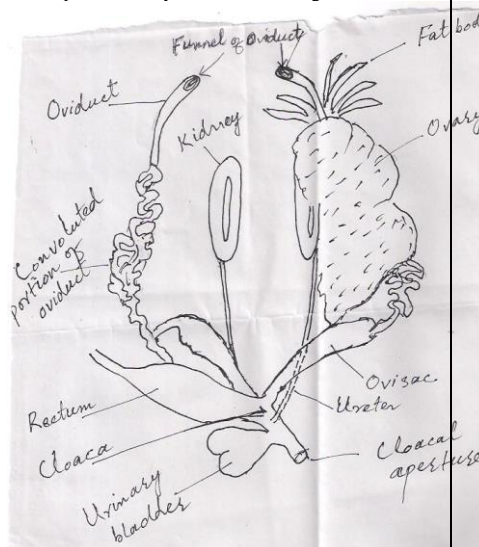
Excretory System of Male Frog

Or

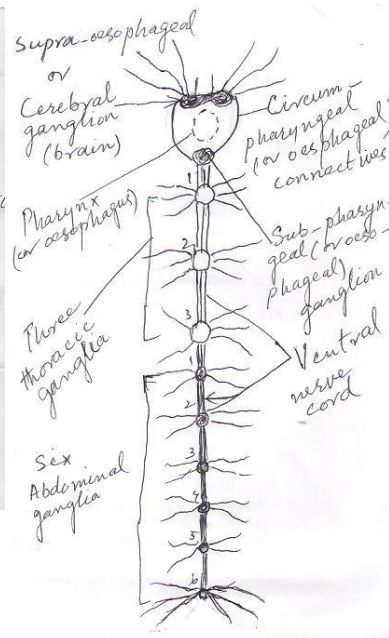
Reproductive System of Male Frog



b. Urinogenital organs of Female Frog  
Or  
Excretory System of Female Frog  
Or  
Reproductive System of Female Frog



B. Nervous System of Cockroach



### PUNJAB BOARD PAPERS LAHORE BOARD

Group I- Session-2012-2014-2014-

A)

#### Questions

10. Note: Attempt any Three questions.

- Sketch and label nervous system of cockroach.
- Draw a labeled diagram of fore-limb of frog.
- Write a brief procedure for demonstration of geotropism, supposed observation, and results.
- Investigate water contents of soil samples.
- Write short answers of the following questions:
  - Differentiate between sensory and motor nerves.
  - What is vertebral column?
  - From which part of seed, root is developed?
  - What are abiotic components of an ecosystem?
  - Define incubation.

#### Answers

10.

A. Labeled Diagram of Nervous System of Cockroach:

See page number

B. Labeled Diagram of Pelvic Girdle of Frog: -

See page number

C. Demonstration of Geotropism: -

See Bahawalpore Board-New Scheme- 2014-A

Answer No: 10 (c)

**D. Experiment to Study the Water Contents of a given****Soil Sample: -**

See Lahore Board-New Scheme- Group-II -2014-A)  
Answer No: 10 (D)

**E. Short Answers: -****a. Difference between Sensory and Motor Nerves: -**

Sensory nerves conduct nerve impulses from receptors to central nervous system while motor nerves conduct nerve impulses from central nervous system to effectors.

**b. Vertebral Column: -**

Vertebral column is the portion of the vertebrate endoskeleton that houses the spinal cord. It consists of

many vertebrae separated by intervertebral discs. Or Vertebral column is a series of bony or cartilaginous vertebrae that enclose and protect dorsal nerve cord.

**c. Part Seed from which Root Developed: -**

Root is developed from radicle (tip of the hypocotyle)

of the embryo of seed.

**d. Abiotic Components of an Ecosystem: -**

Abiotic components of an ecosystem include everything except life, which surrounds and individual and is

not associated with the presence of other organisms.

Or

Abiotic components of an ecosystem include all

non-

living components, i.e. air (atmosphere), water (hydrosphere) and soil (lithosphere).

Or Abiotic factors of an ecosystem are the non-living components of an ecosystem including light, temperature, soil, air, water, inorganic and organic nutrients etc.

**e. Incubation: -**

The development of freshly laid egg is arrested due to

drop in temperature. It cannot be resumed unless the temperature is kept at about 37 °C to 40 °C. The process is called incubation.

In birds incubation is done naturally by the body

heat

of parent birds and artificially by placing eggs in the incubator at 37 °C. Incubation is carried until

hatching

of young takes place. Incubation period lasts about 14 days in pigeon and 21 days in chick.

**LAHORE BOARD**

Group II- (Session 2012-2014)-A-

2014)

**Questions****10. Note: Attempt any Three questions.**

A. Draw the labeled pelvic girdle of frog.

(5)

B. Sketch and label the nervous system of Cockroach.

(5)

C. Draw and label internal structure of unincubated egg

of hen.

(5)

D. Write down procedure and observations in the study of water contents in soil sample.

(5)

E. Write the short answers of the following questions:

(5)

a. What is fertilization?

b. Define cleavage.

c. What is cytokinesis?

d. What is synapsis?

e. Define food web.

**Answers**

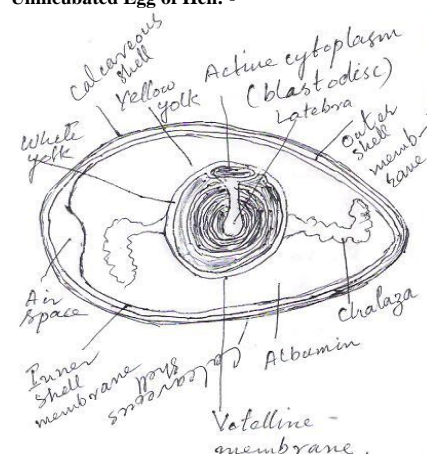
10.

**A. Labeled Diagram of Pelvic Girdle of Frog: -**

See page number

**B. Labeled Diagram of Nervous System of Cockroach:**

See page number

**C) Labeled Diagram of Internal Structure of Unincubated Egg of Hen: -****D. Procedure and Observations in study of Water Contents in Soil Sample: -****a. Procedure: -**

1. Take an evaporating dish, tray or tin box and weigh it.

2. Place the soil sample in the tin which is reweighed.

3. Place the tin in an oven and is dried at 105 °C to 110 °C for 24 hours.

4. Sample is removed from the oven and is cooled in a desiccator. Then sample is reweighed.

5. The difference in weight indicates the loss of water (moisture), which is calculated on percentage basis.

**b. Observations:**

1. Weight of the empty tin box = A

2. Weight of tin box + soil = B

3. Weight of tin after heating in oven and cooling in desiccator = C

4. Weight of moisture (water content) = B - C = K

5. Weight of soil before heating = B - A = L

6. % of moisture (water content) =  $K / L \times 100$

**E. Short Answers: -****a) Fertilization: -**

It is the process of fusion of haploid sperm with the haploid ovum to form a single diploid cell to form a single diploid cell, the zygote. Or  
Fusion of two n gametes resulting in the formation of 2n zygote is called Fertilization.

**b. Cleavage: -**

It is a series of repeated mitotic divisions that take place in fertilized ovum. Or  
It is a series of mitotic cell division, without growth, that converts the zygote to a multicellular blastula.

Or

It is a rapid series of successive cell divisions of a fertilized egg, forming a hollow sphere of cells, the blastula.

**c. Cytokinesis: -**

It refers to division of whole cell. Or  
It is the stage of cell division in which the cytoplasm divides to form two daughter cells. Or  
Division of cytoplasm following mitosis or meiosis

is

called Cytokinesis. Or

It is division of the cytoplasm of a cell after nuclear division.

**d. Synapsis: -**

The pairing of homologous chromosomes during prophase I of meiosis I is known as Synapsis. Or  
Synapsis is the close pairing of homologous chromosomes that takes place early in prophase I of meiosis. During synapsis, the DNA molecules of the two homologous chromosomes are aligned side by side. As a result, a DNA strand of one homologous

can pair with the corresponding DNA strand of other. Or

It is point by point alignment (pairing) of homologous

chromosomes during prophase I of meiosis and during which crossing over occurs.

**e. Food web: -**

Food web arises when organisms consume, or are being consumed, by two or more other organisms. Or

Food web consists of two or more food chains. Or

A complex interconnection of all food chains in an ecosystem is called Food web.

**GUJRANWALA BOARD**

(New Scheme-2014-

A)

**Questions**

10.

A. Sketch and label the female urino-genital system of frog.

(5)

B. Sketch and label the diagram of pelvic girdle of frog.

(5) C. Write down procedure to study mitosis in onion root

tip.

(5)

D. Draw flow chart of food web in the Pond's Ecosystem.

(5)

E. Write the short answers of following questions.

(5)

i. What are hydrophytes? Give an example.

ii. Name the most common auxin.

iii. What is the function of atlas?

iv. What is meant by soil texture?

v. Define food web.

**Answers**

10.

**A. Labeled diagram of the Female Reproductive System of Frog:**

See page number

**B. Labeled diagram of Pelvic Girdle of Frog: -**

See page number

**C. Procedure to study Mitosis in Onion Root Tips: -**

1. Put a drop of water in the centre of a clean slide and put a root tip on the drop of water.

2. Crush the root tip with a sharp scalped.

3. Add a drop of aceto-carmin stain to the root tip and tap it lightly.

4. Place cover slip over the specimen, press the cover slip

gently.

5. Heat the slide gently over the spirit lamp.

6. Observe the slide under low and high magnification to

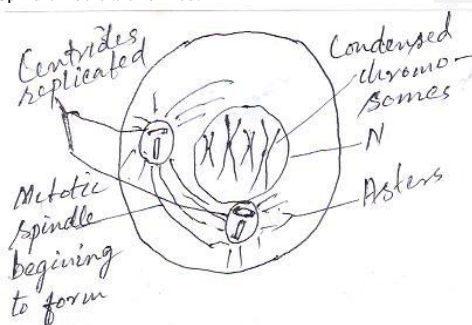
study the following stages of mitosis.

a. Prophase: -

i. Chromosomes look like threads, visible within nucleus.

ii. At least nuclear membrane and nucleoli disappear.

iii. Spindle fibers are formed.

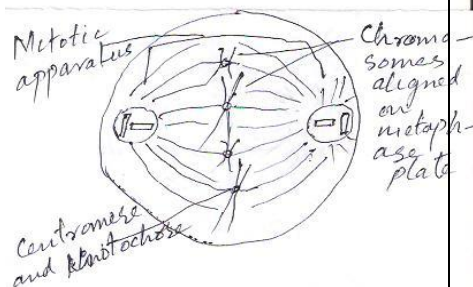


b. Metaphase: -

i. Chromosomes attach at spindle fiber at centromere with the help of kinetochore.

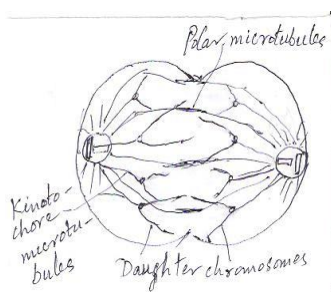
ii. Chromosomes arrange at equatorial plate.





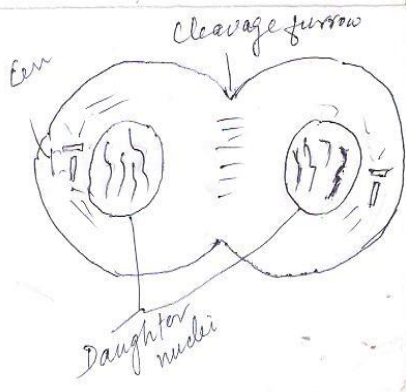
c. Anaphase: -

- i. The two chromatids of each chromosome separate at the centromere as independent chromosomes.
- ii. The chromosomes begin to separate into two groups, each moving towards its respective pole.



d. Telophase: -

- i. Chromosomes at pole become uncoil and invisible.
- ii. Nuclear membrane develops around each group forming daughter nuclei.
- iii. Nucleoli and spindle fibers disappear.



#### D. Flow Chart of Food Web in the Pond's Ecosystem:-

See Bahawalpur Board 2014- A Answer No: 10.D

(b)

E. Short Questions: -

i. **Hydrophytes: -**

See Faisalabad Board 2014- A Answer No: (E) (i)

ii. **Name of the Most Common Auxin: -**

Indole Acetic Acid

iii. **Function of Atlas: -**

This is the vertebra which lifts the skull of an animal.

iv. **Soil Texture: -**

Soil texture is the proportion of particles of different sizes in the soil. Or

Soil texture is determined by the percentages (by weight) of the different sized inorganic particles—sand, silt, and clay—in it.

v. **Food Web: -**

See Lahore Board-Group-II-2014-A

Answer No: (E) (e)

#### GUJRANWALA BOARD

(New Scheme-2015-

A)

#### Questions

10.

- A. Sketch and label nervous system of cockroach. (5)
- B. Sketch and label the hind limb of frog. (5)
- C. Write down an experiment to demonstrate geotropism. (5)
- D. Determine water content of soil. (5)
- E. Write the short answers of following questions. (5)
  - i. What is habitat?
  - ii. What are xerophytes?
  - iii. Define osmoregulation.
  - iv. Define mitotic apparatus.
  - v. What are consumers?

#### Answers

10.

A. **Labeled diagram of the Nervous System of Cockroach: -**

See page number

B. **Labeled diagram of Hind Limb of Frog: -**

See page number

C. **An Experiment To Demonstrate Geotropism: -**

See Bahawalpur Board-New Scheme-204-A

Answer No: 10 (C)

D. **Determination of Water Content of Soil: -**

See Lahore Board-New Scheme-Group-II-2014-A

Answer No: 10 (D)

E. **Short Questions: -**

i. **Habitat: -**

The actual location of place where an organism lives

is called its habitat.

ii. **Xerophytes: -**

Xerophytes are the plants which live in severely dry environment and have adaptations for reduced rate

of

transpiration.

iii. **Osmoregulation: -**

Osmoregulation is the mechanism of regulation, generally between organism and its environment, of solute and the gain and loss of water.

iv. **Mitotic Apparatus: -**

Mitotic apparatus is the specialized microtubule

structure including aster and spindle that provides the framework for chromosome movement during cell division.

**v. Consumers: -**

Consumers are the organisms, primarily animals, which obtain energy directly or indirectly from the producers as ready-made organic food. Or Consumers are heterotrophic organisms, which are mainly animals. They cannot prepare their own food

and hence get prepared food in the form plants and animals.

**MULTAN BOARD**

(New Scheme-2014-

A)

**Questions**

**10. Attempt any three parts.**

A. Sketch and label male urinogenital system of frog.

(5)

B. Sketch and label 9<sup>th</sup> Vertebra of Frog.

(5)

C. Write down the procedure to investigate the Geotropism.

(5)

D. Write down the procedure of simple muscle twitch using frog's skeletal muscle.

(5)

E. Write short answers:

(5)

i. What are Succulent Tissues?

ii. What is Kymograph?

iii. What do you mean by Geotropism?

iv. What is the fate of Ectoderm?

v) What is the function of spindle in cell division?

**Answers**

**10.**

**A. Labeled Diagram of Male Urinogenital system of Frog: -**

See page number

**B. Labeled Diagram of 9<sup>th</sup> vertebra of Frog: -**

See page number

**C. Procedure to Investigate the Geotropism: -**

1. Place the Klinostat (a vertical wheel which can rotate

at various speeds) in horizontal position.

2. A broad bean seedling is attached to the cork.

3. The filter paper is soaked in water so as to keep the atmosphere in the cylinder moist.

4. Rotate the Klinostat at various speed for few days while it is placed in a dark room. Observe the effect

of

rotation on the geotropic response of seedling.

5. Stop the Klinostat and observe the response.

6. It is found that if the speed of Klinostat is very slow, the shoot and root assume the shape of a corkscrew. On the other hand if rotation is sufficiently fast, they show no twisting and make no observable response

to

gravity. When the Klinostat is stopped, the shoot is curved upward and the root downward.

**D. Procedure of simple Muscle Twitch using Frog's**

**Skeletal Muscle: -**

1. Remove the skin of freshly killed frog to avoid any damage to the muscles.

2. Slightly pull the Gastrocnemius muscle between tibio-

fibula and cut its both tendons and pick up the muscle

and put it in a petri dish containing saline (Ringer's solution).

3. Take a wire and attach its one end to negative terminal

of 6 volt battery and other end to one end of muscle.

4. Take second wire which one end is attached to second

end of muscle and let free its other end.

5. Cover the petri dish with a glass plate and seal it with

vaseline.

6. When free end of wire is touched to positive terminal

of the battery, muscle twitches (contracts) and when wire is removed from positive terminal muscle

returns

to its original position (expands).

**E. Short Answers: -**

**i. Succulent Tissues: -**

Succulent tissues are the tissues of stems and leaves of

xerophyte plants which have large parenchyma cells that store water and make them wet and juicy.

**ii. Kymograph: -**

Muscles retain their power of contraction for some time, even after they are removed from the body. The instrument which records contraction of freshly dissected muscle by electrical stimulation is called Kymograph. Or

It is an instrument that is used to record contraction

of

muscles as well as heartbeat of an animal.

**iii. Geotropism: -**

Growth of plant in response to gravity is called Geotropism. Or

A plant's normal response to gravity is called Geotropism. Roots grow towards gravity and are

called

positively geotropic, but shoots grow away from it

and

are therefore negatively geotropic. Or

It is the growth response of roots and stems of plants

to

the earth's gravity.

**iv. The fate of Ectoderm: -**

The outer covering of the body and nervous system develop from the ectoderm. Or

Ectoderm gives rise to the outer epithelium of the

body

(skin, hair, nails) and to the nerve tissue, including the sense organs, brain, and spinal cord. Or

The ectoderm is destined to form the epidermis and neural tissue. Nervous system, epidermis of skin,

and derivatives of the epidermis (hair, nails, glands),

tooth enamel, dentin, and pulp. Epithelial lining of

oral

cavity and rectum.

v) **The Function of Spindle in Cell Division:** -

It brings about the orderly distribution of chromosomes during cell division. Or  
It provides framework for chromosome movement during cell division.

A. Sketch and label male urinogenital system of frog.

(5)  
B. Sketch and label 9<sup>th</sup> Vertebra of Frog.

(5)  
C. Write down the procedure to investigate the Geotropism.

(5)  
D. Write down the procedure of simple muscle twitch using frog's skeletal muscle.

(5)  
E. Write short answers:

(5)  
i. What are Succulent Tissues?

ii. What is Kymograph?

iii. What do you mean by Geotropism?

iv. What is the fate of Ectoderm?

v) What is the function of spindle in cell division?

**MULTAN BOARD**

(New Scheme-2015-

A)

**Questions**

**10. Attempt any three parts.**

A. Make a sketch and label male reproductive system of frog.

(5)  
B. Make the labelled diagram of hind limb of frog.

(5)  
C. Write an experiment to demonstrate the phenomenon of Geotropism.

(5)  
D. Write an experiment to observe the telophase stage of mitosis in a dividing cell.

(5)  
E. Write short answers:

(5)  
i. Define Autecology.

ii. What are biotic components of an ecosystem?

iii. Define Cell Cycle.

iv. Which type of muscles are present in the walls of heart?

v) What is Sarcomere?

**Answers**

10.

A. **Labeled Diagram of Male Reproductive System of**

**Frog:** -

See page number

B. **Labeled Diagram of Hind Limb of Frog:** -

See page number

C. **Experiment to Demonstrate the Phenomenon of Geotropism in Plants:** -

See Bahawalpe Board-New Scheme- 2014-A

Answer No: 10 (C)

**D. Experiment To Observe the Telophase Stage of Mitosis in a Dividing Cell: -**

**A. Requirements: -**

Compound microscope, onion root tips, spirit lamp, 1 molar hydrochloric acid, 2 % Acetocarmine, forceps,

spatula, slides, cover slips, filter paper, watch glass, dropper and fixing jar.

**B. Theory: -**

Vegetative cells of roots, stems and leaves, normally divide by mitosis, a type of cell division in which number of chromosomes remains same as in parent cells. These dividing cells are usually observed in the tips of root and stems.

**C. Preparation: -**

To obtain onion root tips, place an onion bulb on a beaker full of water. After few days roots will begin to

grow. Cut their tips and place them in fixative for 2 hours. Store these tips in 70 % alcohol. Stored tips

are then hydrolysed in 1 molar solution of HCl for 30 minutes to soften the root tips so that their cells can

be

squashed.

**D. Procedure: -**

1. Put a drop of water in the centre of a clean slide and put a root tip on the drop of water.

2. Crush the root tip with a sharp scalped.

3. Add a drop of aceto-carmine stain to the root tip and tap it lightly.

4. Place cover slip over the specimen, press the cover slip

gently.

5. Heat the slide gently over the spirit lamp.

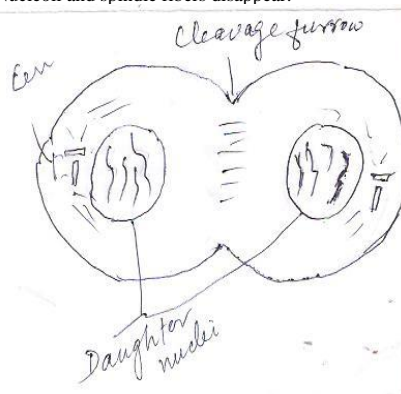
6. Observe the slide under low and high magnification to

study the telophase stage of mitosis in a dividing cell.

i. Chromosomes at pole become uncoil and invisible.

ii. Nuclear membrane develops around each group forming daughter nuclei.

iii. Nucleoli and spindle fibers disappear.



E. **Short Answers: -**



**i. Autecology: -**

They study of relationship of a single population to its environment is called autecology

**ii. Biotic Components of an Ecosystem: -**

Biotic components are the elements of the living world that affect a particular organisms, that is its relationship with other organisms.

Biotic components of include all living organisms of an ecosystem.

**iii. Cell Cycle: -**

The repeating sequence of growth, DNA replication and division through which cells pass each generation is called Cell cycle.

**iv. Type of Muscles Present in the Walls of Heart: -**

Cardiac Muscles

**v) Sarcomere: -**

A sarcomere is the region of a myofibril between two successive Z-line and is the smallest contractile unit of

muscle fiber. Or

A sarcomere is a segment of striated muscle cell between adjacent Z-lines that serves as a unit of contraction.

**BAHAWALPUR BOARD**

(New Scheme-2014-

A)

**Questions**

10. Note:- Attempt ant three questions.

3 x 5 =

15

A. Sketch and label the female reproductive system of Frog.

(5)

B. Sketch and label the diagram of Pelvic Girdle of Frog.

(5)

C. Write an experiment to study the Phenomenon of Geotropism.

(5)

D. Construct a food chain and food web (flow chart) of Pond Ecosystem.

(5)

E. Write short answers of the followings:

(5)

i. Define Positive Geotropism and Negative Geotropism.

ii. What happens to chromosome number when a cell divides by Mitosis.

iii. What are continuous variations? Give examples from Humans.

iv. What is Ganglion?

v. What are Decomposers?

**Answers**

10.

A. Labeled diagram of the Female Reproductive System of Frog: -

See page number

B. Labeled diagram of Pelvic Girdle of Frog: -

See page number

**C. An Experiment to Study the Phenomenon of Geotropism: -****Apparatus**

Corn grains, a pair of petri dishes, cotton, cellophane tape, blotting filter paper.

**Theory**

A tropic movement in response to the stimulus of gravity is called Geotropic movement and the phenomenon is Geotropism. Roots are positively geotropic while the stem is negatively geotropic. It

is

due to unequal distribution of auxin (growth hormone) in the root and shoot tips.

**Procedure**

1. Place four soaked maize grains in petri dish with pointed ends towards the center and broader ends towards outside.

2. Cover the grains with blotting paper and fit it tightly.

3. Place soaked cotton on the paper and the dish is sealed

with cellophane tape.

4. Place this set up vertically with the help of clay or any

other support for few days.

**Observation**

It is noticed after few days that roots grow downward

irrespective of their position and shoot in the upward

direction.

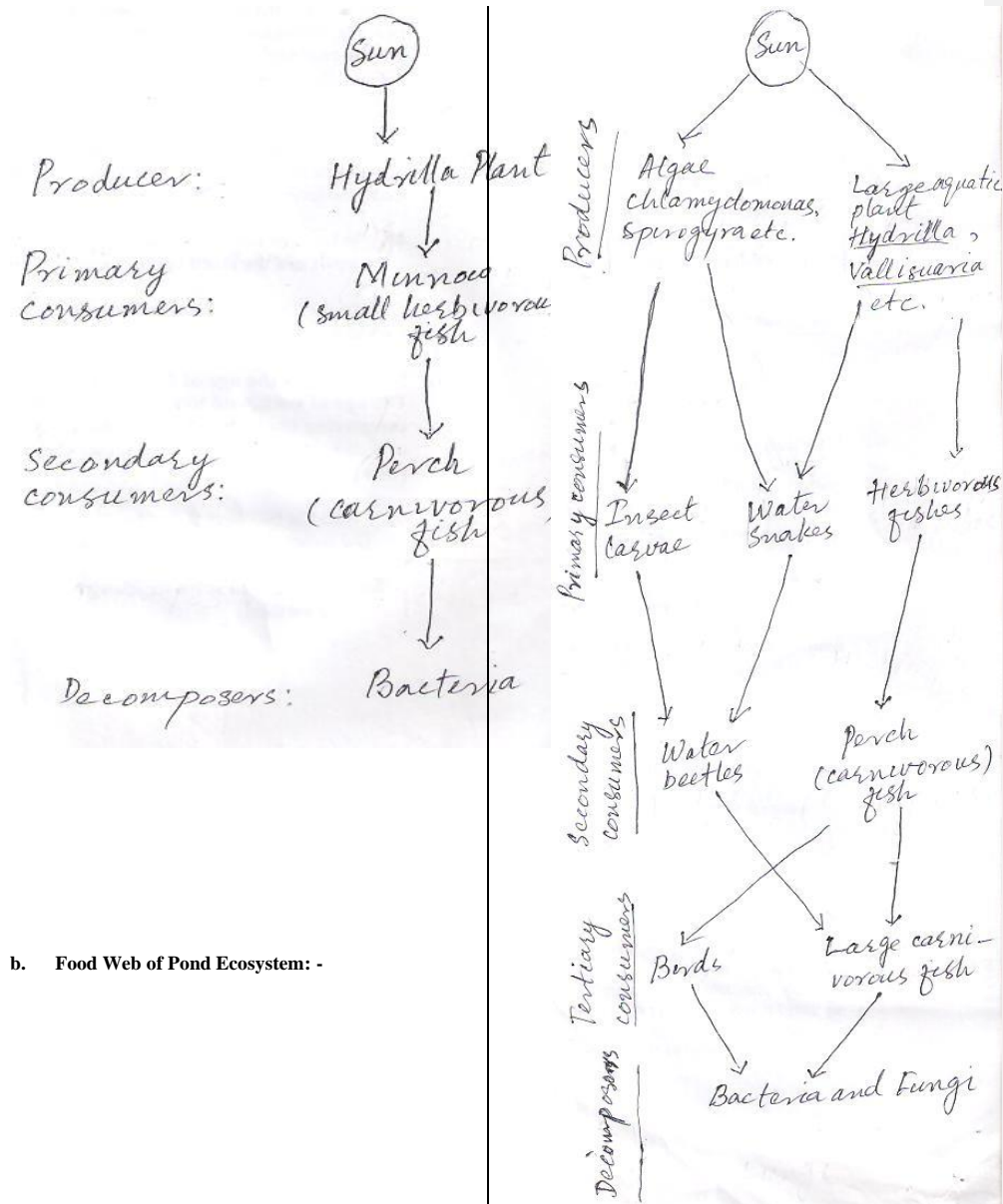
**Conclusion**

This behavior of germinating seeds confirms that roots

are positively geotropic while the stem is negatively geotropic.

**D. A Food Chain and Food Web (Flow Chart) of Pond****Ecosystem: -**

a. A Food Chain of Pond Ecosystem:-



b. Food Web of Pond Ecosystem: -

E. Short answers: -

- Positive Geotropism and Negative Geotropism: -**  
Growth response of some parts of plants towards the earth's gravity is called Positive Geotropism and the growth response of some parts of plants away from the gravity is called Negative Geotropism. Positive geotropism is observed in the primary roots of many plants and negative geotropism in their shoots.
- Chromosome in Mitosis: -**

The chromosome number remains same when the cell divides by Mitosis.

**iii. Continuous Variations with Examples: -**  
Continuous variation occurs when the characteristic is determined by several genes or because growth and development are readily affected by the environment. Examples include height, skin color and intelligence in humans.

**iv. Ganglion: -**  
Ganglion is a collection or bundle of neuron cell bodies usually outside the central nervous system within the PNS. Or  
A mass of neuron cell bodies in the PNS is called Ganglion. Or  
In invertebrates ganglion is an aggregation of nerve cell bodies while in vertebrates, the term is restricted to aggregation of nerve cell bodies located outside the central nervous system.

**v) Decomposers: -**  
Decomposers are organisms, usually bacteria or fungi, that break down organic matter into inorganic nutrients that can be recycled in the environment. Or  
These are microbial heterotrophs that breakdown dead organic material and use the decomposition products as source of energy.

### **BAHAWALPUR BOARD**

(New Scheme-2015-

A)

### **Questions**

**10. Note:- Attempt ant three questions.**

3 x 5 =

15

- A. Sketch and label male urinogenital system of Frog. (5)  
B. Sketch and Label Pelvic Girdle of Frog. (5)  
C. Write down the procedure to investigate soil texture. (5)  
D. Explain and sketch to investigate Mitosis in Plant Cell. (5)

- E. Write short answers of the followings: (5)  
i. Define Food Chain.  
ii. What is the role of Auxin?  
iii. What is Polytene Chromosome?  
iv. What are Xerophytes? Give example.  
v. Define Peripheral Nervous System.

### **Answers**

10.

- A. Labeled Diagram of Male Urinogenital System of Frog: -**  
See page number

### **B. Labeled Diagram of Pelvic Girdle of Frog: -**

See page number

### **C. Procedure To Investigate Soil Texture: -**

First is feel and touch method and second is classification of soil particles on size basis.

#### **a. Feel and Touch Method: -**

Take some soil in a beaker and then press and feel between thumb and finger in dry and well as moist soil.

It is squeezed between thumb and finger and the texture is determined by following table.

| S.No. | Examination of Soil                                                                                                                         | Texture   |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 1.    | Individual grains can be seen or felt, non plastic and gritty. Only moist soil.                                                             | Sand      |
| 2     | Individual grains can be seen and felt, dry soil from cast, but fall apart.                                                                 | Sand loam |
| 3     | While moist soil form cast that does not break contain more sand than clay.                                                                 | Loam      |
| 4     | Dry soil form cast but need careful handling. Moist soil form cast and can be handled easily. Contain equal amount of sand and clay         | Silt loam |
| 5     | Dry soil appears cluddy, soft and form cast. Most soil can not form ribbon and can contain more sand than loan, floury, talc like, plastic. | Clay loam |
| 6     | Dry soil hard, breaks into clods and lumps. Moist soil form their ribbon, breaks readily more clay then sand, plastic.                      | Clay      |
|       | Dry soil form vey hard clods or lumps. Wet soil form long flexible ribbon particles very small, very plastic.                               |           |

#### **b. Classification of soil particle on size basis: -**

Soil is passed successively through series of sieves with different sizes and their meshes.

| S. No. |                     |             |
|--------|---------------------|-------------|
| 1      | Below 0.002 mm      | Clay        |
| 2      | 0.002 ----- 0.02 mm | Silt        |
| 3      | 0.02 ----- 0.20 mm  | Fine sand   |
| 4      | 0.20 ----- 2.00 mm  | Coarse sand |

#### **Result: -**

The texture of given soil is ----- .

### **D, Investigation of Mitosis in Plant Cell: -**

See Gujranwala Board-New Scheme- 2015-A  
Answer No: 10 (C)

#### **E. Short Answers of the Followings: -**

##### **i. Food Chain: -**

A food chain is a sequence of feeding relationships between organisms living within the same community.

Or

The passing of food material from producers to the primary consumers and then to secondary and tertiary consumers is called Food Chain.

##### **ii. Role of Auxin: -**

1. Auxins are responsible for positive gravitropism of

- roots and negative gravitropism of stems.
- Auxins stimulate cell division, cell enlargement, and bring about the increase in length of the plant.
  - Auxins also initiate the development of adventitious roots when applied at the cut base of stem.

### iii. Polytene Chromosome: -

Polytene chromosomes are a large sized many stranded chromosome which is found in the salivary gland cells, gut epithelial cells and in the malpighian tubules of larvae of certain insects such as fruit fly *Drosophila*.

### iv. Xerophytes with Example: -

Xerophytes are the plants which live in severely dry environment and have adaptations for reduced rate of transpiration.

Example: - Cacti

### v. Peripheral Nervous System: -

## FAISALABAD BOARD

(New Scheme-2014-

A)

## Questions

10. Note: Attempt any THREE parts. Each part carries 05 marks.

- Sketch and label the excretory and reproductive system of female frog.
- Sketch and label the hind limb of frog.
- Write an experiment to study the polytene chromosome. Also make its labeled diagram.
- Write down the procedure to determine water content of a soil sample.
- Give short answers:
  - Define hydrophytes.
  - What is kymograph?
  - What is an ecological pyramid?
  - Define ganglion.
  - What is the use of clinostat?

## Answers

10.

### A. Labeled diagram of the Excretory and Reproductive System of Female Frog: -

See page number

### B. Labeled diagram of the Hind Limb of Frog: -

See page number

### C. An Experiment to Study the Polytene Chromosome with its Labeled Diagram: -

#### Apparatus

Compound microscope, permanent prepared slide of polytene chromosome

#### Theory

Polytene (many stranded) chromosomes are large sized chromosomes found in the salivary gland cells, gut epithelial cells and in the malpighian tubules of larvae of certain insects such as fruit fly *Drosophila*. These

chromosomes are formed when DNA replicates many times without mitosis and cytokinesis. A typical polytene chromosome may consist of more than 1000

DNA double helices (along with associated histones and other proteins) aligned side by side.

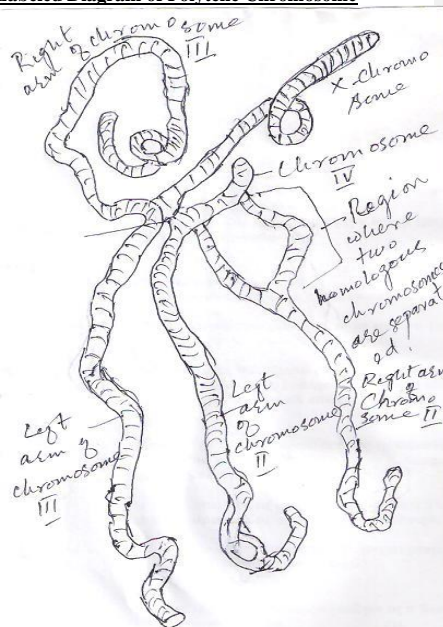
#### Procedure

- Place the slide and examine it under low and high powers of microscope.
- Observe the parts of polytene chromosome and Draw the labeled diagram of its parts by examining it under microscope.

#### Observations

- It shows many darkly stained bands.
- These bands contain loci of many genes.
- It contains more than 1000 DNA double helices.
- Puffs (expanded sites of chromosome) are seen.

#### Labeled Diagram of Polytene Chromosome



### D. The Procedure to determine Water Content of a Soil sample: -

See Lahore Board-Session 2012-14-Group-II-2014-

A)

Answer No: 10 (D)

### E. Short Answers: -

#### i. Hydrophytes: -

These are the plants which live in water, thus require large quantity of water.

Example: - *Hydrilla*

#### ii. Kymograph: -

See Multan Board-New Scheme-2014-A)

Answer 10 (E) (ii)

#### iii. Ecological Pyramid: -

Ecological pyramid is a pictorial graph based on the biomass, number of organisms, or energy content of

various trophic levels in a food web – from the producer to the final consumer populations.

**iv. Ganglion: -**

See Multan Board (New Scheme-2014-A)  
Answer 10 (E) (iv)

**v. Use of Clinostat: -**

Clinostat is used to demonstrate Geotropism. Or  
It is used to eliminate the effect of light and gravity on the parts of plant.

**FAISALABAD BOARD**

(New Scheme-2015-

A)

**Questions**

**10. Note: Attempt any THREE parts. Each part carries 05 marks.**

- Make a sketch and label the female reproductive system of frog.
  - Make the labeled diagram of pelvic girdle of frog.
  - Write an experiment to observe the hen's fresh egg and make its labeled diagram.
  - Write an experiment to observe the anaphase stage of mitosis in a dividing cell.
- E. Give short answers:
- Define parasitism.
  - Define population.
  - What is I-band?
  - What changes occur in S-phase of interphase?
  - What is myofibril?

**Answers**

10.

**A. Labeled Diagram of the Female Reproductive System of Frog: -**

See page number

**B. Labeled Diagram of Pelvic Girdle of Frog: -**

See page number

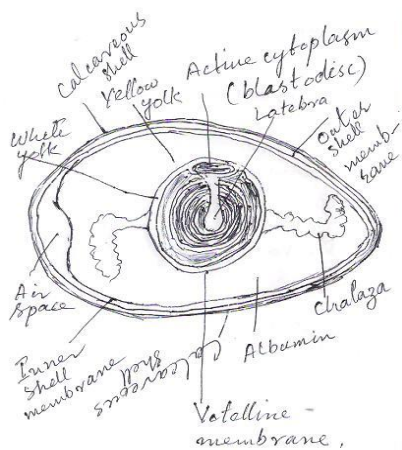
**C. An Experiment to Observe Hen's Fresh Egg: -**

**A. Requirements: -**

A fresh hen's egg, petridish, tap water etc.

**B. Procedure: -**

Carefully break the calcareous shell and pour the contents in petridish without breaking the yolk. The egg shell is lined internally by double membranes, the shell membranes. Inside these membranes a whitish fluid like albumen is filled. It has two whitish spirally twisted cords, the chalazae, one on either side of the ovum. Within the albumen, there is a sphere containing yellowish yolk. The embryo is restricted here in a very small space called blastoderm or germinal disc.



**D. An Experiment to Observe Anaphase Stage of Mitosis in a Dividing Cell: -**

**A. Requirements: -**

Compound microscope, onion root tips, spirit lamp, 1 molar hydrochloric acid, 2 % Acetocarmine, forceps, spatula, slides, cover slips, filter paper, watch glass, dropper and fixing jar.

**B. Theory: -**

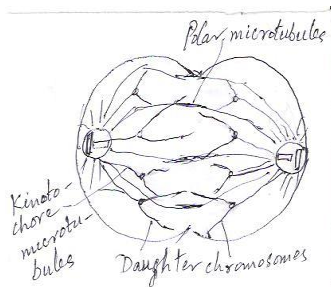
Vegetative cells of roots, stems and leaves, normally divide by mitosis, a type of cell division in which number of chromosomes remains same as in parent cells. These dividing cells are usually observed in the tips of root and stems.

**C. Preparation: -**

To obtain onion root tips, place an onion bulb on a beaker full of water. After few days roots will begin to grow. Cut their tips and place them in fixative for 2 hours. Store these tips in 70 % alcohol. Stored tips are then hydrolysed in 1 molar solution of HCl for 30 minutes to soften the root tips so that their cells can be squashed.

**D. Procedure: -**

- Put a drop of water in the centre of a clean slide and put a root tip on the drop of water.
- Crush the root tip with a sharp scalpel.
- Add a drop of aceto-carmine stain to the root tip and tap it lightly.
- Place cover slip over the specimen, press the cover slip gently.
- Heat the slide gently over the spirit lamp.
- Observe the slide under low and high magnification to study the anaphase stage of mitosis in a dividing cell.
  - The two chromatids of each chromosome separate at the centromere as independent chromosomes.
  - The chromosomes begin to separate into two groups, each moving towards its respective pole.

**E. Short Answers: -****i. Parasitism: -**

It is an association between different organisms of two

different species, in which the smaller species (parasite) lives upon or within the other (host); the host is frequently harmed by this relationship.

**ii. Population: -**

Population is a group of interbreeding individuals of same species occurring together in space and time.

**iii. I-Band: -**

It is light band that is isotropic or non-polarizing. It consists of only thin fibers.

**iv. Changes Occurring in S-Phase of Interphase: -**

DNA is synthesized and chromosome number is doubled in S-phase of interphase.

**v. Myofibril: -**

Myofibril is a tiny thread like structure in the cytoplasm of striated muscle that is responsible for contraction of the cell. It consists of myofilaments.

**RAWALPINDI BOARD**

(New Pattern) (2014-

A)

**Questions**

**10. Note: Attempt any three parts from the following:**

- Sketch and label the nervous system of cockroach.
- Draw and label different bones of forelimbs of frog.
- Write down procedure to demonstrate phenomenon of

Geotropism.

- Investigate the water contents of soil sample.
- Write down short answers of the following:
  - What are amphibious kind of hydrophytes.
  - Define muscle.
  - What are the glands with ducts known as?
  - Why is the egg shell porous?
  - What is meant by balanced ecosystem?

**Answers****A. Labeled Diagram of Nervous System of****Cockroach: -**

See page number 258

**B. Labeled Diagrams of Different Bones of Forelimbs of**

**Frog: -**

See page number 255

**C. Procedure to Demonstrate phenomenon of Geotropism: -**

- Place four soaked maize grains in petri dish with pointed ends towards the center and broader ends towards outside.
- Cover the grains with blotting paper and fit it tightly.
- Place soaked cotton on the paper and the dish is sealed with cellophane tape.
- Place this set up vertically with the help of clay or any other support for few days.
- It is noticed after few days that roots grow downward irrespective of their position and shoot in the upward direction.

**D. Investigation of the Water Contents of Soil Sample:**

See Lahore Board (Session 2012-14) Group II (2014-

A)

Answer No: 10 (D)

**E. Short Answers: -****i. Amphibious Kind of Hydrophytes: -**

These are the aquatic plants which can live when pond is dry.

Examples: -

Typha, Ranunculus, etc.

**ii. Muscle: -**

Muscle is a tissue specialized for contraction. Or It is an organ that produces movement by contraction

**iii. Glands with Ducts: -**

The glands with ducts are known as duct glands or exocrine glands

Examples:-

Salivary Glands, Gastric Glands etc.

**iv. Porous Egg Shell: -**

Egg shell is porous for gaseous exchange.

**v. Balanced Ecosystem: -****RAWALPINDI BOARD**

(New Pattern-2015-

A)

**Questions**

**10. Note: Attempt any three parts from the following:**

- Sketch and label the male reproductive system of frog.
- Make the labelled diagram of urostyle of frog.
- Write down the procedure to study mitosis in onion root tips. Draw the metaphase and telophase stages.
- Draw and label the structure of hen's egg.
- Write down short answers of the following:
  - How much energy is passed from one trophic level to

- other trophic level?
- What is difference between positive and negative phototropism?
  - Define muscle twitch.
  - Give the position of Nervous System in Cockroach.
  - Give the behavior of chromosome during metaphase.

### Answers

#### A. Labeled Diagram of Male Reproductive System of Frog: -

See page number

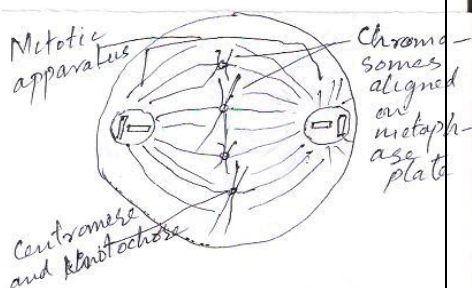
#### B. Labeled Diagram Urostyle Frog: -

See page number

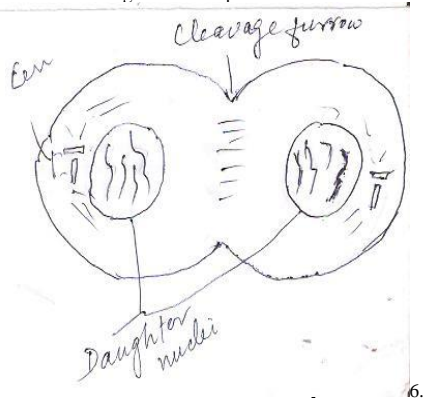
#### C. Procedure to study Mitosis in Onion Root Tips: -

- Put a drop of water in the centre of a clean slide and put a root tip on the drop of water.
- Crush the root tip with a sharp scalpel.
- Add a drop of aceto-carmine stain to the root tip and tap it lightly.
- Place cover slip over the specimen, press the cover slip gently.
- Heat the slide gently over the spirit lamp.
- Observe the slide under low and high magnification to study the stages of mitosis: -

#### a. Labeled Diagram of Metaphase: -



#### b. Labeled Diagram of Telophase: -



#### D. Labeled Diagram of Structure of Hen's Egg: -

See Lahore Board-Session 2012-14-Group II-2014-A  
Answer No: 10 (C)

#### E. Short Answers: -

#### i. Amount of Energy Passed From One Trophic Level To Another: -

#### ii. Difference between Positive and Negative Phototropism: -

Growth movement of parts of plant towards light is called positive phototropism while growth movement of parts of plants away from light is called negative phototropism.

#### iii. Muscle Twitch: -

Mild contraction of muscle is called muscle twitch.

#### iv. Position of Nervous System in Cockroach: -

Position of Nervous System in Cockroach is ventral.

#### v. Behavior of Chromosome During Metaphase: -

Chromosome align at the equatorial plate during metaphase.

### SARGODHA BOARD

New Scheme—

2014-A

### Questions

10.

- Sketch and label the Nervous System of Cockroach. (5)
- Sketch and label the diagram of pelvic girdle of frog. (5)

- Write down procedure to study Phototropism in plants. (5)

- Write an experiment to study the water contents of a given soil sample. (5)

- Give short answers. (5)

- From which side cockroach is dissected and why?
- What is test cross?
- What is significance of using ringer's solution?
- How soil is formed?
- Point out the effect of Auxins on plant.

### Answers

10.

#### A. Labeled diagram of Nervous System of Cockroach:

See page number

#### B. Labeled diagram of Pelvic Girdle of Frog: -

See page number

#### C. Procedure to study Phototropism in Plants: -

- Take four pots A,B,C,D.
- Sow some bean seed in each pot.
- Put pots B,C,D in a line and in a box having window.
- Put a lamp out the box in front of window. Turn on the lamp. Leave the seed for germination up to 5 days.
- Let the pot A without illumination.
- In due course of the time seeds would grow into seedling. Study the effect of presence and absence of light on germinating seed.
- It is observed that seedlings in a pot A are much

weaker, straight and elongated than the seedlings in the remainder other three.

8. The seedlings in pots B,C,D have their shoots bent toward the window of the box.

**D. Experiment to study the Water Contents of a given**

**Soil Sample: -**

See Lahore Board (Session-2012-14) GroupII-2014-

- A) Answer No: 10 (D) (v)

**E. i. Side from which Cockroach is Dissected: -**

Cockroach is dissected on the dorsal side due to presence of nerve cord on ventral side.

**ii. Test Cross: -**

Cross-fertilization of a phenotypically dominant individual with a homozygous recessive individual in order to determine the homozygosity or heterozygosity of the dominant parent is called Test Cross.

**iii. Significance of Using Ringer's Solution: -**

It keeps the organs of frog alive for considerable period.

**iv. Formation of Soil: -**

1. Formation of soil takes a long time. A centimeter of soil may develop within 15 years.
2. Soil formation begins with the weathering of rock in the Earth's crust. Weathering first gradually breaks down rock to rubble and then to soil particles.
3. Organisms also play a role in formation of soil. Lichens and mosses grow on pure rock and trap particles that later allow, grasses, herbs, and soil animals to follow. When these die, their remains are decomposed by bacteria and fungi. Decaying organic matter called humus begins to accumulate. Humus supplies nutrients to plants, and its acidity leaches minerals from rock.

**v. Effect of Auxins on Plants: -**

1. Auxins stimulate cell division, cell enlargement, and brings about the increase in length of the plant.
2. Auxins also initiates the development of adventitious roots when applied at the cut base of stem.

**DERA KHAZI KHAN BOARD**

(New Course-Group-I-2014-

A)

**Questions**

**10. Attempt any three parts from A, B, C, D and E.**

5 x 3 =  
15

- A. Sketch and label the Male urino-genital system of frog.  
(5)  
B. Sketch and label hind limb of frog.  
(5)  
C. Write procedure and observations in the Geotropism.  
(5)  
D. How will you investigate the water contents in the soil sample.  
(5)  
E. Give short answers.  
(5)

- i. Define mitosis.
- ii. What is the composition of soil?
- iii. What are halophytes? Give an example.
- iv. Define chemotropism.
- v. What is coleoptile?

**Answers**

10.

**A. Labeled diagram of the Male Urino-genital System**

**of Frog: -**

See page number

**B. Labeled diagram of Hind Limb of Frog: -**

See page number

**C) Procedure and Observations in the Geotropism: -**

See Multan Board (New Scheme) (2014-A)

Answer No: 10 (C)

**D Investigation of the Water Contents in the Soil Sample:-**

See Lahore Board (Session 2012-14) GroupII (2014-

A)

Answer No: 10 (D)

**E. Short Answers: -**

**i. Mitosis: -**

It is division of cell nucleus resulting in two daughter nuclei, each with the same number of chromosomes

as

the parent nucleus. Or

The process in which a parent cell nucleus produces two daughter nuclei, each having the same number

and

kinds of chromosomes as the parent nucleus. Or

Mitosis is a type of cell division which maintains the chromosome number. In other word, the normal diploid (2n) number of chromosomes is maintained

in

the new cells.

**ii. The Composition of Soil: -**

- a. Inorganic mineral particles --- Make up about 45 % of

a typical soil

- b. Organic matter ---- About 5 %

- c. Water ----- About 25 %

- d. Air ---- About 25 %

**iii. Halophytes with an Example: -**

The plants growing in salt marshes close to sea are termed as Halophytes. Or

Plants living in soil with high concentration of salt

are

called Halophytes.

Example: - *Chenopodium album* (Bathu or Goose foot)

**iv. Chemotropism: -**

Chemotropism is the movement caused due to chemical. Or

The movement in response to some chemicals is called

Chemotropism.

Example: -

The pollen tube grows through the style towards

ovary

due to chemical stimulus.

**v. Coleoptile: -**



Coleoptile is the sheath that protects the tip of plumule of some plants such as wheat. Or It is a protective covering that covers the young leaves of a seedling.

### DERA KHAZI KHAN BOARD

(New Course-Group-I-2015-

A)

### Questions

10. Attempt any three parts from A, B, C, D and E.

5 x 3 =

15

A. Sketch and label female urinogenital system of Frog.

(5)

B. Sketch and label hind limb of frog.

(5)

C. Write down the procedure to investigate polytene chromosome of *Drosophila*.

(5)

D. Write down the procedure of food chain and food web

of Pond Ecosystem.

(5)

E. Give short answers.

(5)

i. Define Ecosystem.

ii. What is muscle twitch?

iii. What are kymograph?

iv. What is the fate of Mesoderm?

v. Define zone of junction.

### Answers

10.

A. Labeled diagram of the Female Urinogenital System

of Frog: -

See page number

B. Labeled diagram of Hind Limb of Frog: -

See page number

C. Procedure To Investigate Polytene Chromosome of

*Drosophila*: -

See Faisalabad Board-New Scheme-2014-A)

Answer No: 10 (C)

D. Procedure of Food Chain and Food Web of Pond Ecosystem: -

1. First the plants and animals growing near margin of pond are collected.

2. Then plants and animals are collected from different levels of pond and are placed in test tubes, jars and polythene bags.

3. These collected plants and animals are brought to laboratory for proper identification.

4. The decomposers i.e. fungi and bacteria are identified

for their after their proper growth.

5. The organisms are grouped according to trophic level and are separated to construct the food chain and food

web.

a. Producers: -

1. Phytoplankton and algae ---- *Chlamydomonas*, *Spirogyra*, *Nostoc* and Diatoms

2. Submerged plants ---- *Hydrilla*, *Vallisneria*

3. Free floating plants ---- *Pistia*, *Lemna*

4. Amphibious plants ---- *Typha*, *Ranunculus*

b. Consumers: -

1. Primary consumers ----- Molluscs, insect larvae, tadpole, water snakes and herbivorous fishes (Minnow)

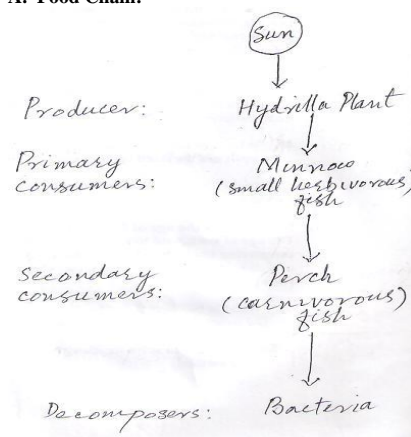
2. Secondary consumers ----- Frog, water beetles, carnivorous fishes (Perch)

3. Tertiary consumers ---- Large carnivorous fishes, birds

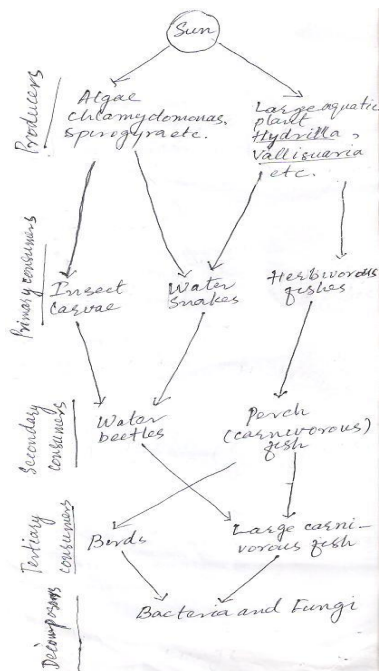
c. Decomposers: -

Bacteria and fungi

A. Food Chain: -



B. Food Web: -

**E. Short Answers: -****i. Ecosystem: -**

A biological community together with the associated abiotic environment is called Ecosystem.

**ii. Muscle Twitch: -**

Mild contraction of muscle is called muscle twitch.

**iii. Kymograph: -**

See Multan Board-New Scheme-2014-A)

Answer 10 (E) (ii)

**iv. Fate of Mesoderm: -**

Mesoderm forms muscular, skeletal and reproductive systems.

**v. Zone of Junction: -**

The marginal area of the blastoderm in which cells remain unattached from the yolk and closely adherent

to it is called the zone of junction.

**DERA KHAZI KHAN BOARD**

(New Course-Group-II-2014-

A)

**Questions****10. Attempt any three parts from A, B, C, D and E.**

5 x 3 =

15

A. Make a labeled diagram of Male reproductive system of Frog.

(5)

B. Give three leaf modifications of xerophytes with the help of diagram.

(5)

C. Write a brief procedure, supposed observations and results to demonstrate Phototropism.

(5)

D. Write down the procedure to study water contents in the Soil samples.

(5)

E. Write short answers.

i. Enlist types of Tropism.

ii. What is histogram?

iii. Give use of Kymograph.

iv. What are pyramids?

v. Define Ecosystem.

**Answers****A. Labeled Diagram of Male Reproductive system of**

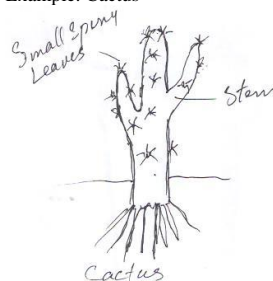
**Frog: -**

See page number

**B. Three Leaf Modifications of Xerophytes with the help of Diagrams: -**

1. Leaves are modified into spines.

Example: Cactus



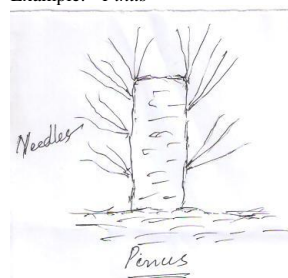
2. Leaves are thick and succulent, possessing water storage tissue and mucilage.

Example: - Aloe



3. Leaves are modified into narrow needle like structures.

Example: - Pinus

**C. Phototropism: -****a. Procedure: -**

1. Take four pots A,B,C,D.

2. Sow some bean seed in each pot.
3. Put pots B,C,D in a line and in a box having window.
4. Put a lamp out the box in front of window. Turn on the lamp. Leave the seed for germination up to 5 days.
5. Let the pot A without illumination.
6. In due course of the time seeds would grow into seedling. Study the effect of presence and absence of light on germinating seed.

**b. Supposed Observations: -**

1. It is observed that seedlings in a pot A are much weaker, straight and elongated than the seedlings in the remainder other three.
2. The seedlings in pots B,C,D have their shoots bent toward the window of the box.
3. When root is gently exposed, it is observed that roots are bent in direction away from source of light.

**c. Results: -**

Shoots show phototropism growing towards light while roots show negative phototropism growing away from light.

**D. Procedure to study Water Contents in the Soil Samples: -**

See Lahore Board (Session 2012-14) Group II (2014-

A)

Answer No: 10 (D)

**E. Short Answers: -**

**i. Types of Tropism: -**

1. Phototropism
2. Gravitropism (Geotropism)
3. Hydrotropism
4. Chemotropism
5. Thigmotropism

**ii. Histogram: -**

It is a frequency diagram. Or

It is a graph showing frequency distribution of a hereditary trait.

**iii. Use of Kymograph: -**

Kymograph is used to record contraction of freshly dissected muscle by electrical stimulation. Or It is used to record contraction of muscles as well as heartbeat of an animal.

**iv. Pyramids: -**

Pyramids are pictorial graphs representing biomass, organism number, or energy content of each trophic level in a food web from the producer to the final consumer populations.

**v. Ecosystem: -**

A biological community together with the associated abiotic environment is called Ecosystem.

**DERA KHAZI KHAN BOARD**

(New Course-Group-II-2015-

A)

**Questions**

10. Attempt any three parts from A, B, C, D and E.

5 x 3 = 15

- A. Sketch and label nervous system of cockroach. (5)
- B. Sketch and label pelvic girdle of frog. (5)

C. Write down the procedure to study mitosis in onion root tips.

(5)

D. Investigate the food chain and food web of an aquatic / pond ecosystem.

(5)

E. Give short answers.

(5)

- i. Give three examples of xerophytes.
- ii. Enlist types of tropisms.
- iii. What is the fate of mesoderm?
- iv. What type of response to light is shown by roots and shoots?
- iv. What is the fate of Mesoderm?
- v. What are prairies?

**Answers**

10.

**A. Labeled diagram of Nervous System of Cockroach: -**

See page number

**B. Labeled Diagram of Pelvic Girdle of Frog: -**

See page number

**C. Procedure To Study Mitosis in Onion Root Tips; -**

See Gujranwala Board-New Scheme-2014-A)

Answer No: 10 (C)

**D. Investigation of Food Chain and Food Web of An Aquatic / Pond Ecosystem: -**

See D.G.K Board-New Course-Group-I-2015-A

Answer No: 10 (D)

**E. Short Answers: -**

**i. Tree Examples of Xerophytes: -**

1. Cacti
2. Euphorbia
3. Acacia

**ii. Types of Tropisms: -**

1. Phototropism
2. Gravitropism (Geotropism)
3. Hydrotropism
4. Chemotropism
5. Thigmotropism

**iv. Fate of Mesoderm:-**

Mesoderm gives rise to muscular, skeletal and reproductive systems.

**v. Prairies: -**

Prairies are grasslands present in temperate climates which do not have woody plants, such as Prairies of North America, Pampas of Argentina.

**SAHIWAL BOARD**

(New Scheme) (2014-

A)

**Questions**

10. Note: Attempt any three (3) parts:

5x3=15

- A. Draw a labeled diagram of urinogenital system of a male frog.
- B. Sketch labeled diagram of humerus of frog.
- C. Draw stages of mitosis.
- D. Draw and label polytene chromosome.
- E. Give short answers:

- What are mesophytes?
- What is quadrat?
- What is Geotropism?
- Write use of Agar?
- What are sex chromosomes?

### Answers

10.

#### A. Labeled diagram of Urinogenital System of a Male

Frog: -

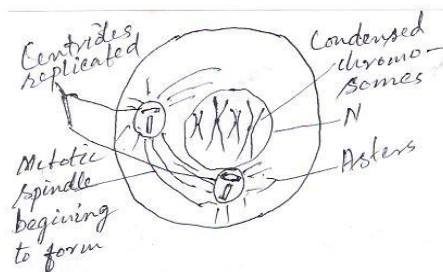
See page number

#### B. Labeled diagram of Humerus of Frog: -

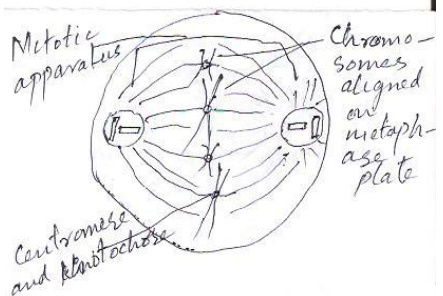
See page number

#### C. Diagrams of Stages of Mitosis:-

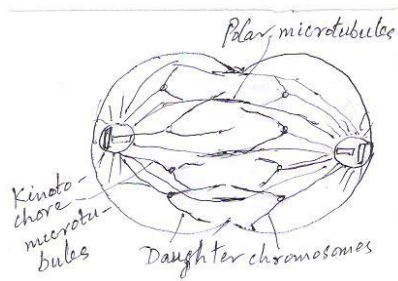
##### 1. Prophase of Mitosis: -



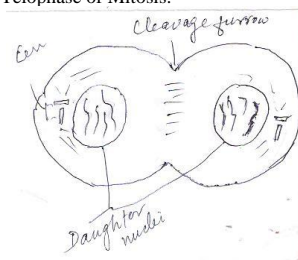
##### 2. Metaphase of Mitosis: -



##### 3. Anaphase of Mitosis: -



##### 4. Telophase of Mitosis: -



#### D. Labeled diagram of Polytene Chromosome: -

See Faisalabad Board (New Scheme) (2014-A)

Answer No: 10 (c)

#### E. Short Answers: -

##### i. Mesophytes: -

These are terrestrial plants which require moderate amount of water. The plants which grow in normal well-watered soil are called Mesophytes.

Examples: - Wheat, maize, sunflower, cucurbita plants.

##### ii. Quadrat: -

Quadrat is a frame (usually 0.5m x 0.5m) which is placed on the ground, and plants inside it are identified.

It can either randomly or in fixed pattern. Or Quadrat is a small square chosen randomly to study ecosystem. The components in the quadrates reflect the component of all ecosystem.

##### iii. Geotropism: -

See Multan Board (New Scheme) (2014-A)

Answer No: 10 (E) (iii)

##### iv. Use of Agar: -

Agar is used as food thickener and a culture medium,

a

substrate on which to grow microorganisms and propagate some plants such as agar. Or Agar is used commercially to make capsules for vitamins and drugs, as material for making dental impressions, and a base for cosmetics. In the laboratory, agar is a solidifying agent for a bacterial culture medium. When purified, agar becomes gel

for

electrophoresis, the process in which DNA fragments are separated on the basis of their size. Agar is also used in food preparation.

##### v. Sex Chromosomes: -

Sex chromosomes are the chromosomes that determine the sex of an individual. Or These are the chromosomes which are active in determining the sex of an individual. In humans and fruit flies, the sex chromosomes in females are XX and those in males are XY.

**SAHIWAL BOARD**

(New Scheme-2015-

A)

**Questions**

10. Note: Attempt any three (3) parts:  
5x3=15

- A. Sketch and label nervous system of cockroach. (5)
- B. Sketch and label hind limb of frog. (5)
- C. Write an experiment to demonstrate phototropism. (5)
- D. Demonstrate the water content of soil. (5)
- E. Write short answers: (5)
  - i. What is habitat.
  - ii. What are xerophytes?
  - iii. Define the mitotic apparatus.
  - iv. What are predators?
  - v. Define osmoregulation.

**Answers**

**A. Labeled Diagram of Nervous System of Cockroach: -**

See page number 258

**B. Labeled Diagrams of Different Bones of Hindlimbs of**

**Frog: -**

See page number 255

**C. An Experiment to Demonstrate Phototropism: -**

**A. Requirements: -**

A box having black surface from inside with a slit on one side. A potted and a bulb with holder.

**B. Procedure: -**

1. Take a properly growing potted plant.
2. Place the potted plant in a box of black inner surface with a slit.
3. Put the box in window with slit facing light.
4. Keep this box for a week in this condition and observe it.

**C. Observations: -**

After a week, it is observed that the shoot of the plant is bent towards source of light.

**D. Result: -**

Shoot shows light induced growth movement and is positive phototropism.

**D. Investigation of the Water Contents of Soil Sample:**

See Lahore Board (Session 2012-14) Group II (2014-

A)

Answer No: 10 (D)

**E. Short Answers: -****i. Habitat: -**

The actual location of place where an organism lives is called its habitat.

**ii. Xerophytes: -**

Xerophytes are the plants which live in severely dry environment and have adaptations for reduced rate of transpiration.

**iii. Mitotic Apparatus: -**

Mitotic apparatus is the specialized microtubule structure including aster and spindle that provides the framework for chromosome movement during cell division.

**iv. Predators: -**

Predators are the animals that kill and devour other animals (the prey). Or Predators are animals that prey on other animals. A predator is a consumer.

**v. Osmoregulation: -**

Osmoregulation is the mechanism of regulation, generally between organism and its environment, of solute and the gain and loss of water.